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Anne W. Branscomb

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I. INTRODUCTION

A. *The Information Society*

Transborder data flow, the transfer of computer readable information across national borders, has become a matter of international concern. With the marriage of satellites and computers, groups as diverse as religious organizations and terrorist bands in microseconds can transfer vast amounts of the world's accumulated knowledge simultaneously to users around the globe. The politics and economics of information access are complex. The new technologies may disrupt relationships between nation states and their nationals, whether individuals or corporate entities. For example, as computerized information systems facilitate international trade and financial transactions, multinational businesses are proliferating. Indeed, improved transborder data flow will facilitate global contacts of all varieties as users form their own distributed computer networks[1] and employ them for their own purposes.

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* Chairman of Communications Division of Science and Technology Section of the American Bar Association.

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1. A distributed computer network facilitating communication among numerous users relies upon the implementation of an organizational pattern that links the users' communication equipment, the transmission facilities, and the central computer. *See, e.g.*, S. HILTZ & M. TUROFF, THE NETWORK NATION: HUMAN COMMUNICATION VIA COMPUTER (1978). Such networks are used for many purposes, for example, to support local transactions and to keep

Technological advances in transnational communication greatly enhance the ability of users to pursue both eleemosynary and criminal purposes. Whether individual users of international systems will achieve their goals, either good or evil, will depend upon the policies and practices concerning transborder data flow that the nation states adopt. Individuals, groups, or organizations may influence the accommodation of the legal system to the new technological environment only if they understand which goals are desirable, the values that are at stake, and the options that are available. This Article reviews the current global ferment in policy directives concerning transborder data flows and projects the options that individuals, organizations, and governments might choose to attain their objectives.

The position of the United States is changing in the world debate on global governance. In 1945 the United States provided the leadership to establish an international forum for the discussion of human rights and the minimization of armed conflict.[2] In 1962 the United States led the world into an international common carrier satellite system, INTELSAT.[3] Despite its traditional stance of encouraging worldwide cooperation on information technology, however, the United States seems increasingly unready, unwilling, and even unable to lead the world community into an international system of information exchange that maximizes shared use of information resources.[4] As the United States sees its leadership position

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the information consistent with information in other computers at remote locations. Typical applications are airline reservations, retail point of sale transactions, credit verification, electronic funds transfers, teleconferencing, cooperative research, and shared creative efforts. For detailed presentation of current technical issues in computer networks in communication systems, see INSTITUTION OF ELECTRICAL ENGINEERING, COMPUTER NETWORKING SYMPOSIUM (1981); UNIVERSITÉ DE LIÉGE, COMPUTER NETWORK PROTOCOLS (1978).

2. Representatives of the United States, the Union of Soviet Socialist Republics, and the United Kingdom reached agreements at the Dumbarton Oaks Conference held in Washington, D.C., 1944, for the establishment of a general international organization to maintain international peace and security. *See* UNITED STATES DEPARTMENT OF STATE, DUMBARTON OAKS DOCUMENTS ON INTERNATIONAL ORGANIZATION (1944). The United Nations Conference on International Organization drafted the Charter of the United Nations at San Francisco from April 25 to June 26, 1945, and it became effective October 24, 1945. A COMPREHENSIVE HANDBOOK OF THE UNITED NATIONS 107 n.1 (1978).

3. The Communications Satellite Corporation organized in 1962 led to the establishment of the International Telecommunications Satellite Organization (INTELSAT) in 1964. INTELSAT is a "102-member consortium of governments which operates very much like a commercial entity." Fishman, *Introduction to Transborder Data Flows*, 16 STAN. J. INT'L L. 1, 7 n.27 (1980). For a discussion of INTELSAT, its services, and criticisms of the system, see *infra* notes 60-76 and accompanying text.

4. For a discussion of the benefits the United States might reap by leading the world community into an international system of information exchange, see Address by Arthur C.

eroded by strong competitors in the international information marketplace, the pendulum of American opinion on these policy questions swings in the opposite direction towards information protectionism, information independence, and even information indifference.[5]

Information is the lifeblood that sustains political, social, and business decisions. Power resides in those entities that control the communications system and consequently the gathering, processing, distribution, and storage of information. In primitive societies the individuals who controlled information and information exchange stored the data in human brains and distributed it in face-to-face encounters over which they had exclusive control. In these societies the death of a learned brain was the loss of a human library. "Recorded history" emerged with the technology of writing on stone, papyrus, or paper. Since the time of Marco Polo or earlier, merchants have circled the globe in search of gold, spices, and other precious cargo. Monks have established monasteries in the far corners of the most remote and inaccessible places to carry their version of the truth to the heathens. Chinese bureaucrats, Roman soldiers, Greek philosophers, American moviemakers and Japanese television manufacturers all have pursued a global marketplace in both manufactured goods and information products. Today, tourists and bankers alike enjoy the benefits of a worldwide system. In the modern world electronic brains gather, store, and distribute vast amounts of information. Satellites circling the globe can place an electronic eye over a third of the earth's surface, collect information, and deliver it to any other spot on earth instantaneously. The coupling of computers with advanced communications systems can merge voice, image, text, and symbols to render obsolete the customary legal distinctions that people have used to govern the delivery of information by telegraphy, telephone, television, or newsprint.[6]

The very existence of information technology is threatening to

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Clarke to the United Nations Committee on Disarmament (Aug. 31, 1982), *reprinted in* 128 CONG. REC. E4307-09 (daily ed. Sept. 21, 1982) (statement of Rep. Brown).

5. Indeed, the most recent U.S. policy analysis evidences both myopia and paranoia. *See* NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, 98TH CONG., 1ST SESS., U.S. LONG-RANGE GOALS IN INTERNATIONAL TELECOMMUNICATIONS AND INFORMATION xi-xii (Comm. Print 1983) [hereinafter cited as NTIA Report], which is the best available historical documentation of current United States policies and organizational problems although it makes little mention of any responsibilities the United States might have in helping to develop and to maintain a global system of telecommunications.

6. *See infra* text accompanying notes 194-204.

nation states. A satellite "footprint"[7] has great difficulty honoring national boundaries. The beam can remain within the national territorial limits only over land masses that are geographically isolated, like Australia, or vast, like the Soviet Union or the People's Republic of China. Computers do not question the motives of their masters. Thus, information wars are brewing over how governments and private industries will develop these computerized information systems and what kinds of political and social systems will evolve in response to their existence.

The United States has a great stake in the heated debate over transborder data flow. As a developer of both satellites and computers, it still leads the world in the manufacture of telematics hardware.[8] The United States also is the world's largest supplier of data bases for the distribution and management of information. Yet, strong competition threatens the country's superiority. Japan, for example, has established a goal of becoming an "Information Society" by the end of the 1980's.[9] Moreover, potential competitors like Canada and France see telematics as a major source of economic strength.[10] Smaller countries view the telematics infrastructure as crucial to their own economic development plans for industrialization.[11] Thus, the health of the American economy is at

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7. A satellite footprint is the area on the earth's surface covered by the satellite's beam. R. FREEMAN, TELECOMMUNICATION TRANSMISSION HANDBOOK 346, 612-13 (2d ed. 1981). For example, the LANDSAT satellite system uses an area coverage scanner, which collects data in areas approximately 115 miles square. A return beam relays the data to earth stations in a beam which covers approximately 61 miles square. For a discussion of the LANDSAT system, see RYDER'S STANDARD GEOGRAPHIC REFERENCE: THE UNITED STATES OF AMERICA 176-77 (1981); *infra* part III, section C.

8. D. SCHILLER, THE U.S. OFFENSIVE IN INTERNATIONAL TELEMATICS 148 (1982). "Estimates for the telecommunications equipment market in 1987 indicate a U.S. market of about $34 billion and a world market of just under $60 billion." NTIA Report, *supra* note 5, at 156.

9. *See* HOUSE COMM. ON GOVERNMENT OPERATIONS, INTERNATIONAL INFORMATION FLOW: FORGING A NEW FRAMEWORK, H. REP. No. 1535, 96th Cong., 2d Sess. 4 (1980); Fishman, *supra* note 3, at 8 & n.30.

10. *See* Fishman, *supra* note 3, at 7-10.

11. *See, e.g.*, Bortnick, *International Information Flow: The Developing World Perspective*, 14 CORNELL INT'L L. J. 333, 334-37 (1981) (developing nations' desire for information technology and barriers to this goal); Brizida, *The Brazilian Transborder Data Flow Policy*, TRANSNAT'L DATA REP., vol. 4, no. 3, at 19 (1980) ("boom" in need for transborder data flow makes its development high priority in Brazil); Address by R.E. Butler, Secretary-General of the International Telecommunication Union (ITU), before the Pacific Telecommunicatious Council 6 (Jan. 18, 1983) ("stimulating telecommunications development in the developing world" a key goal of ITU); J. Dans, Strategy for the Integration of the Telecommunications Sector in a Developing Country Under a Free Enterprise Economy 3 (June 7, 1982) (Presentation to the Third Annual Pacific Telecommunications Seminar in Manila, Philippines).

stake. American foreign investment is far greater than that of any other nation state ($190 billion in 1979).[12] Much of this investment is in service industries, such as restaurant franchises that are as popular in Japan as in the United States. United States-based consultants travel the globe offering advice on manufacturing projects that may be receiving capital and other input from both domestic and foreign sources. Transborder data flow has become indispensable to the very existence of transnational enterprise and to the currently flourishing global marketplace. The service sector of the American economy alone employs more than half the nation's workers and contributes over a third of its exports. Services—especially information services—are the most rapidly growing economic sector both domestically and abroad.[13] In addition, American consumers' insatiable appetite for imported goods has made the United States less self-sufficient than it once was. Thus, free transborder data flow may be essential to national survival in an increasingly interdependent global economy.

Two futurists who have examined the potential impact of computer technology on the world have developed similar visions of the characteristics of an information society. Yoneji Masuda has observed that such a society amplifies the mental power of humans while it minimizes their physical labor. In addition, an information society transforms the exchange economy into a synergistic economy in which society pursues social goals through voluntary information rather than geographically based communities. This society maximizes self-actualization and self-fulfillment rather than physical acquisition of durable goods, increases participatory democracy and social feedback mechanisms, and promotes "*the spirit of globalism, a symbiosis in which man and nature* can live together in harmony. . . ."[14] Exactly ten years after Mr. Masuda presented his ideas, Harlan Cleveland pronounced his notion of desirable goals for an information society. He observed that in an economy based upon abundant, synergistic, energy conservative information resources should encourage spreading of benefits rather than concentration of wealth, maximization of choice rather than suppression of diversity, and planning in collegial and participatory decision-making about shared social goals.[15] These visions of social

12. D. SCHILLER, *supra* note 8, at 108 (1982).
13. HOUSE COMM. ON GOVERNMENT OPERATIONS, *supra* note 9, at 26.
14. MASUDA, THE INFORMATION SOCIETY AS POST-INDUSTRIAL SOCIETY, 33 (1981).
15. Cleveland, *How Leaders Must Change in the Information Age*, Christian Sci. Monitor, Feb. 16, 1981, at 27, col. 1.

structure and goals differ from the competitive market model that Americans have valued throughout their history. Although the competitive market is entirely appropriate for an industrial society based upon a mass market and consumer choice in an ever expanding economy, this traditional model may be entirely inappropriate and counterproductive for an information society in a globally interdependent economy in which citizens must share both resources and decisions about their allocation.

B. Definitions

Variations in the definitions that commentators have ascribed to the term "transborder data flows" contribute to the confusion in current discussions. No ambiguity exists in the definition of "transborder," which means across national political boundaries, or "flows," which means movement. No consistent construction, however, exists for the term "data." According to the dictionary, data is "that upon which an inference or an argument is based, or from which an ideal system of any sort is constructed."[16] Data basically is the raw material from which people develop information and knowledge. The current primary concern in discussions of transborder data flow, however, clearly is about computer-generated information. People have transported data across geographical boundary lines in many forms and by many means for centuries. Therefore, all data presently cannot be of concern; rather, debate centers around a specific kind of data that a specific type or types of transmission systems transport. Many descriptions of this data exist. For example, William Fishman speaks of "electronic movement of data between countries."[17] Rein Turn discusses "transmission over computer-communications systems of automated data to be processed and stored in foreign data processing systems."[18] Eric Novotny discusses "units of information coded electronically for processing by one or more digital computers which transfer or process the information in more than one nation-state."[19] Professor Pool and Mr. Solomon refer to "computer communications, telecommunications networks. . . . [d]igitalized transmission enab[ling] voice and data traffic to be handled in a single mixed

16. WEBSTER'S NEW INTERNATIONAL DICTIONARY 671 (2d ed. 1967) (defining "datum," the singular form of "data").

17. Fishman, *supra* note 3, at 1.

18. PAC. TELECOMS. CONF. Proceedings, 1980 at I-D, 31 (D. Wedemeyer ed.).

19. Novotny, *Transborder Data Flows and International Law: A Framework for Policy-Oriented Inquiry*, 16 STAN. J. INT'L L. 141, 143-44 (1980).

stream of data."[20] Mr. Antonelli speaks of "international flows of data associated with computer communications. . . ."[21] Documents of the Intergovernmental Bureau for Informatics discuss "transmission of data over telecommunications circuits."[22] Philip Lemoine defines transborder data flow as international information trade in a computer-generated and machine-readable format.[23] This definition includes all computer-to-computer, computer-to-human, and human-to-computer communication.

The Bing Report,[24] unlike other works on the subject, addresses the ambiguities in definition. Most other writings merely assume that the reader understands the problem well enough to ignore the definitional difficulties. Bing includes in his report on legal issues all transport of "data," which means "any representation of information" over "telecommunications"—defined by the International Telecommunications Union as wire, radio, optical, or other electromagnetic means.[25] Bing, however, limits his discussion to all computer services capable of accepting written material including electronic mail, information retrieval, teledocuments, and data processing.[26] This definition excludes voice and image transmissions.[27]

No doubt exists that the new ferment about transborder data flow has arisen from the covergence of computer technology, which stores and processes information, and communications technology, which permits rapid dissemination of this information to all parts of the globe by satellite, undersea cable, or conventional radio. The various definitions of transborder data flow fail to discriminate with respect to the type of transmission; some descriptions include the transport of computer tapes across national boundaries by conventional transportation methods, such as an individual taking the

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20. Pool & Solomon, *Intellectual Property and Transborder Data Flows*, 16 STAN. J. INT'L L. 113, 114-15 (1980).

21. C. Antonelli, Transborder Data Flows and International Business 5 (June 2, 1981) (written for Expert Group on Transborder Data Flows, Organisation for Economic Co-operation and Development).

22. Intergovernmental Bureau for Informatics, Issues on Transborder Data Flow Policies (Sept. 1979) (Documents on Policies for Informatics) (SPIN-230).

23. Lemoine, *Transborder Data Flows*, INFORMATION SYSTEMS MAGAZINE, Spring 1979, No. 30.

24. Bing, Forsberg & Nygaard, Legal Issues Related to Transborder Data Flows (June 2, 1981) (preliminary study for Expert Group on Transborder Data Flows, Organisation for Economic Co-Operation and Development) [hereinafter cited as Bing Report].

25. *Id.* at 4.

26. *Id.* at 5.

27. *Id.*

tape by commercial air carrier. Definitions in the work of Mark Feldman and David Garcia are representative of a flexible, expansive approach:

> Man's rapidly developing ability to transfer information across national boundaries has become a crucial component in our increasingly integrated world economy. The advent of the computer has revolutionized man's capacity to process and store information. Simultaneously, man's capacity to transmit information has been dramatically increased by a variety of telecommunications innovations, including increasingly effective cable transmissions and orbiting satellites. Together, these two technologies have resulted in a transborder data flow (TDF) essential to expanding international economic development.[28]

Interesting and complex legal issues arise in the context of the marriage between computer technology and satellite technology; in which scientists can merge voice, image, and text into a single system with a digital bit stream[29] and thus render obsolete the traditional legal principles that have separated telephony, telegraphy, television, post, and personal delivery. For example, passport regulations and travel permits that governments use to facilitate or inhibit transborder information flows which require personal travel may be totally inadequate to regulate participants who may see and hear each other as well as deliver documents through a computer printout in their various locations. Moreover, laws that traditionally have governed the delivery of messages sent by postal services may be unsatisfactory in protecting information delivery by microwave or satellite circuits from electronic interception.

This Article's examination of the development of the international system of information exchange limits its inquiry to transnational transport of computer generated and machine readable digital data via electronic transmission. This definition includes voice, image, characters, and other symbols transported by satellite, microwave, cable, or conventional radio in a converged digital bit stream[30] that does not discriminate between types of communica-

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28. Feldman and Garcia, *National Regulation of Transborder Data Flows*, 7 N.C.J. INT'L LAW & COM. REG. 1, 1 (1982).

29. Digital Technology represents all the information that occurs in a process in discrete integral numbers. C. SIPPL, DATA COMMUNICATIONS DICTIONARY 132 (1976). In electronic operations, the most practical application of available devices results from the use of the binary number system that allows only the digits 0 and 1. *Id.* at 28. A single character in a binary number is a bit. *Id.* at 29. Thus, the expression of data for transmission by a satellite system appears as a stream of bits. *Id.* For a discussion of recent developments in digital communication see INSTITUTION OF ELECTRICAL ENGINEERS, TELECOMMUNICATION TRANSMISSION—INTO THE DIGITAL ERA (1981).

30. Packet switching is only one kind of network. The basic functions of a computer are storage, transmission, retrieval, manipulation, and control. Computers facilitate the

tions services. These delivery systems now are called integrated services digital networks (ISDNs).[31] The last part of the Article[32] examines the legal environment in which these networks currently are developing.

C. A Taxonomy of Information

In addition to the problem of definition, another difficulty in understanding the issues related to transborder data flow is that the information in transit is not all of equal value. For example, yesterday's news is not worth much on the information market, but financial information about potential mergers or acquisitions may have great value to persons who discover the facts first. That sixteenth century Augsburg bankers published the first European newspaper was no accident.[33]

A huge variety of information is available for distribution. Governments spend mammoth amounts of money to keep secure some information, such as the technical specifications of nuclear weapons.[34] Public and private groups, in contrast, seek to disseminate without charge information concerning, for example, health care aid to pregnant women in developing countries. Profit-seeking enterprises distribute a wide variety of other types of information. For example, an active international marketplace now exists for scientific and technical information as well as for entertainment and news products. Licensing of United States patents is as active as the marketing of its manufactured goods, and the international market for American movies, television programs, books, and magazines is quite strong. Publishers of *Reader's Digest* distribute the magazine throughout the world in many languages; Dow Jones now publishes a Hong Kong edition of the *Wall Street Journal*

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transmission of users' communications by receiving the messages, converting them to digital bit streams; separating the bit streams into packets; and controlling the transmission of these packets in microsecond bursts on a channel of the communications system. This method allows the communication channel to accommodate the transmission of many messages from multiple users simultaneously simply by coordinating the flow of the packets. For a discussion of packet switching concepts, see PROTOCOLS AND TECHNIQUES FOR DATA COMMUNICATION NETWORKS (F. Kuo ed. 1981).

31. *See generally* V. BHARGAVA, D. HACCOUN, R. MATYAS, & P. NUSPL, DIGITAL COMMUNICATIONS BY SATELLITE: MODULATION, MULTIPLE ACCESS AND CODING 229-268 (1981) (discussion of integrated systems that operate on time-division multiple access technology).

32. *See infra* notes 236-60 and accompanying text.

33. See notes Hamelink, *Banks' Control and Use of Information*, 5 TRANSNAT'L DATA REP., No. 1, 1982, at 21.

34. For a discussion of United States government restrictions on the flow of scientific and technical data, see *infra* text accompanying notes 120-40.

directly by satellite. *Time* magazine is available in 191 countries. Viewers throughout the world watch Hollywood movies, and American television programs are as well known in foreign capitals as Chase Manhattan, Citibank, and American Express.

Clearly, a taxonomy of information is necessary to sort out the legal issues that arise from information flows across national borders. The legal environment in which the "hot line" between the Kremlin and the White House operates is very different from the one in which a hurricane alert system works. To avoid catching information in which a high priority exists for flow without legal constraints in the same legal net designed to control information in which nation states have a legitimate interest, one must examine separately the legal environment of each type of information flow. The taxonomy in this Article includes at least eleven types of information: (1) personal; (2) political; (3) scientific and technical; (4) strategic and military; (5) health, safety, and environmental; (6) economic; (7) financial; (8) management; (9) educational; (10) religious and moral; (11) news and entertainment.

II. GLOBAL GOVERNANCE OF INTERNATIONAL INFORMATION TRANSPORT BY ELECTRONIC MEANS

Territorial imperative and natural geographical boundaries inhibited the transport of information in primitive societies. Nevertheless, a system of respect developed early for the personal integrity of the messenger bringing information from other cultures or tribes. Although some Greek rulers reportedly cut out the tongues of messengers bearing bad tidings, this policy was self-defeating, because it stifled the flow of reliable information that rulers could use to make decisions rationally. From this background, the tradition has developed that personal representatives of nation states possess an immunity from the application of local laws.[35] Messengers physically transporting information through the territories of other nation states may travel unmolested unless a host nation shows that the messengers are violating the trust that the state has granted by using their presence to promote activities inimical to the interests of the host nation.[36] Oswald Ganley has pointed out:

35. Vienna Convention on Diplomatic Relations Apr. 18, 1961, arts. XXVII, XXIX, 23 U.S.T. 3227, 3239, 3240; 500 U.N.T.S. 95, 108, 110.

36. 18 U.S.C.A. § 2511(3), *repealed by* Foreign Intelligence Surveillance Act of 1978; *see also* Exec. Order No. 12,333, 46 Fed. Reg. 59,941, 59,951 (2.5) (1980) (Foreign Intelligence Surveillance Act and Executive Order govern electronic surveillance policy).

> Information has always traveled by the fastest or most convenient means for communicating it, whether that be by speaking, yelling, smoke signaling, beating drums, sending a runner with a message, entrusting a note to a packetboat or the pony express or a carrier pigeon, posting or flashing lights, writing, printing and distributing books, newspapers, and magazines, or making use of the postal system.
>
> Whether the information was spoken, or handwritten, or printed with ink, or recorded on wax, film, or magnetic tape, the purpose has always been the same: To take whatever information was available and convey it to someone for social, informative, entertainment, educational, financial, commercial, political, or military ends. In this sense, nothing has ever changed.[37]

The immediacy, bulk, and complexity of the information that modern "messengers" can carry across national boundaries by cable or satellite interconnected data networks has changed, however. A substantial body of international law has developed concerning the transport of information in written documents through the mails. The earliest governmental response, the Universal Postal Union, began in 1878 to negotiate and develop acceptable protocols for the posts.[38] Agreements promulgated bilaterally and through the efforts of the World Intellectual Property Organization have protected proprietary rights in published works.[39] This Article, however, restricts its review to international and intergovernmental efforts that concern transport of information by electronic means.

An international legal system for electronic transport of information grew out of the frustration of telegraph operators having to hand carry telegraphic messages from a telegraph terminal in one country across the border to a telegraph terminal in a neighboring country. This arrangement could result in distortion, loss, or interception of the messages. Frustration and the widespread awareness that the technology was available to deliver messages from source to user without this delay resulted in the creation of the International Telegraph Union in Paris in 1865. The treaty that established the Union granted participating nations the right to correspond by telegraph, provided for protection of the secrecy of the transmissions, and established uniformity in tariffs and regulations.[40] Article 2 of the treaty, however, reserved the right of na-

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37. G. GANLEY & O. GANLEY, THE U.S. AND ITS COMMUNICATIONS AND INFORMATION RESOURCES: INTERNATIONAL IMPLICATIONS 15 (Program on Information Resources Policy) (1980).

38. The UPU originated under provisions of the Treaty of Bern of 1875 and operated under the Universal Copyright Convention signed by the United States on September 16, 1955.

39. The World Intellectual Property Organization began under a Convention that 51 countries signed in Stockholm in 1967 and that now includes 88 nations.

40. International Telegraph Convention of Paris, May 17, 1865, 9 Recueil de Traités

tion states to stop any telegram that they considered dangerous to national security or contrary to the law, public order, or good morals of the receiving country.[41] Although the United States no longer recognizes this mandate for state censorship, the provision remains part of the Union's regulations.[42] After plenipotentiary meetings that all signatory nations attended in Paris in 1865, Vienna in 1868, Rome in 1871-72, and Saint Petersburg in 1875, the advent of the telephone in 1876 prompted the International Telegraph Union to add another "T" to its name and become known as the International Telegraph and Telephone Union.

A separate organization developed in 1903 to regulate the use of radio technology.[43] This negotiating body was a response to the monopolistic practices of the Marconi Wireless Company. Marconi negotiated contracts to install equipment only in ocean-going vessels that agreed to refuse to communicate with vessels that Marconi had not equipped.[44] Concern that this antitrust practice might endanger the safety of maritime transportation prompted international cooperation to establish safety regulations. Coastal and ship stations thereafter "bound [themselves] to exchange wireless telegrams reciprocally without distinction of the wireless telegraph system adopted by such stations."[45] Signatory nations could reserve the right to ignore this requirement provided one or more coastal stations in their territory remained subject to the obligation. Eighteen of the twenty-seven nations signing the treaty did not make any reservations and twenty-one countries signed compulsory interconnection agreements for ship-to-ship transmissions. Compulsory obligation to install radio transmitters and receivers followed shortly after the disastrous sinking of the Titanic, in which many passengers might not have lost their lives if vessels in the vicinity had been listening to their radios.[46]

(France) 254.

41. 56 British and Foreign State Papers 294; *see* Glazer, *The Law-Making Treaties of the International Telecommunications Union Through Time and in Space*, 60 MICH. L. REV. 269, 272 n.12 (1962).

42. Article 85, Final Protocol to the Telegraph Regulations, Nov. 29, 1958, 10 U.S.T. 2611, 2613 & 2995, T.I.A.S. No. 4390.

43. An international convention established the International Radiotelegraph Union in 1906. Berlin Radiotelegraph Convention, Nov. 3, 1906, 37 Stat. 1565, T.S. No. 568. The organization remained in existence until 1932, when the newly born International Telecommunications Union absorbed its functions. Glazer, *supra* note 41, at 274-79; *see infra* text accompanying notes 47-48.

44. Glazer, *supra* note 41, at 274.

45. *Id.* at 275.

46. *Id.*

By 1932 nations began to realize the advantages of merging radio, telephone, and telegraph functions into a single agency, and the International Telecommunications Union (ITU) emerged. In 1947 the ITU became a part of the United Nations.[47] The ITU essentially is a cooperative venture among nations that provides a forum for negotiating agreements which facilitate the flow of information across national borders by electronic means. The ITU also serves as an administrative means for identifying and recording users, their frequencies, and their purposes. Perhaps the organization's major contribution is in the development of international technical standards through which technicians can interconnect different operating systems into a global network.[48]

The ITU primarily has been a forum for participants from technical backgrounds to address the resolution of technical issues. Lawyers and politicians rarely have made appearances in the many conferences and consultative committees through which the ITU functions. The United States' sixty-seven member delegation to the World Administrative Conference in 1979 included only two lawyers and the only participant there with sufficient political skills to function effectively in an international political arena had responsibilities to numerous other agencies.[49] Increasingly, however, the decisions that the technical representatives make have political and legal consequences of great significance. Political considerations more often motivate the requests of member nations as the third world countries seek greater access to the global communications systems. Concerns over access are part and parcel of the larger effort of third-world nations to establish a new economic order and a more balanced distribution of the world's resources.[50] The third world is waging this effort in the United Nations General Assembly, in UNESCO, and in the ITU.[51]

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47. International Telecommunication Convention, Oct. 2, 1947, 63 Stat. 1399, T.I.A.S. No. 1901, 30 U.N.T.S. 316. *See generally* CODDING, JR. & A. RUTKOWSKI, THE INTERNATIONAL TELECOMMUNICATION UNION IN A CHANGING WORLD (1982) (thorough survey of ITU's history, present structure and functions, and prospects for the future); D. LEIVE, INTERNATIONAL TELECOMMUNICATIONS AND INTERNATIONAL LAW: THE REGULATION OF THE RADIO SPECTRUM (1970) (analysis of how nations apportion the communications spectrum).

48. J. BROWN & E. BLAZIER, TELECOMMUNICATIONS 235 (1974); J. MARTIN, TELECOMMUNICATIONS AND THE COMPUTER 39 (2d ed. 1976). The most recent examples relevant to TDF are the X.25 interface standards for packet switched networks and the efforts to produce an international standard for videotex services.

49. This person was the Deputy Chief of the United States Mission to the European Office of the United Nations and Other International Organizations.

50. G.A. Res. 3281, 29 GAOR Supp. 30, U.N. Doc. A/9030 at 40 (1974).

51. *See infra* note 246. *See generally* S. MacBride, Many Voices, One World: Toward

In the ITU context the struggle has meant a rejection of the "first come, first served" principles under which nation states merely initiated services and recorded them for all to see within the International Frequency Registration Board. Developing nations are applying increasing pressure to allocate frequencies according to equitable formulae, and two of the three world regions already have allocated geostationary orbits for direct broadcast satellites. The United States forestalled the planning exercise for satellite allocation for the North and South American region 2 until 1983 in the hope that it could circumvent the exercise. The United States also claimed that a priori planning would result in inefficient use of the spectrum.[52] However inefficient early allocation may be, the third world nations—which wield substantial power in the ITU because of the principle of majority rule[53]—may find this planning an expedient way to obtain control over resources of economic value. Third world governments might then lease or negotiate away these information resources for technology transfer or capital investment in their own telecommunications infrastructure.

The ITU continues to work because it must; without it, global electronic communication could not function. Participation is completely voluntary; the organization has no sanctions to enforce compliance and no mandate to develop operational services. Indeed, the ITU may not have sufficient resources to do more than set the agenda for training and consulting services for developing countries, although the organization has undertaken a very ambitious project in its World Year of Communications: Development of Communications Infrastructures[54] focusing the world's attention upon the necessity of providing these advisory services to all nations. Upon taking office the new Secretary General of the ITU called the world telecommunications network "the largest machine in the world . . . a marvel of the century . . . [including] 550 million telephones, 560 million television receivers, 1.4 million telex terminals, thousands of data networks and other special-purpose

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a New More Just and More Efficient World Information and Communication Order (1980) (Report of the International Commission for the Study of Communications Problems).

52. The electromagnetic spectrum is a continuous range of frequencies "from the longest known electrical wave to the shortest cosmic ray." C. SIPPL, *supra* note 29, at 451. A chart showing the breakdown of the electronmagnetic spectrum by frequency and wavelength appears at R. BONES, DICTIONARY OF TELECOMMUNICATIONS 194 (1970).

53. Robinson, *Regulating International Airwaves: The 1979 WARC*, 21 VA. J. INT'L L. 1, 34-35 (1980).

54. Address by R. E. Butler, *supra* note 11.

transmission systems.[55] Yet ninety percent of these installations serve only fifteen percent of the world's nations. Secretary General Butler has made it his goal to see that the ITU becomes a tool for expanding the global network to include more of the underserved:

> Communication is an inexhaustible resource, an ever-growing technology which can greatly enhance the use of all the earth's resources, natural, human and economic. . . . [t]he harmonious and well-balanced development of an ever-closer-knit world communications network is a major historical event in keeping with the emergence of a collective awareness among mankind as a whole. . . . [n]o-one any longer should be isolated from the national or international community. Communications should be a right and not a privilege.[56]

Secretary General Butler's statement is more a political tactic than a legal argument, although a growing sentiment exists that the right "to seek, receive, and impart information" contained in the Universal Declaration of Human Rights[57] should become more than a mere exhortation to the world's conscience.[58] To turn the ITU's essentially neutral forum into a politically charged battleground for the determination of power structures or the development of legal principles likely would jeopardize its value as a device for formulating the technical standards upon which the very existence of the global network now rests. Thus, partisans who tamper with the ITU or press upon it substantial new responsibilities do so at their peril. Technical innovations in themselves are beginning to overwhelm the capacity of the present bureaucracy; the increasing number of special conferences scheduled for the next few years and the decreasing time between world administrative conferences are evidence of this problem.[59]

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55. *Id.*

56. *Id.*

57. G.A. Res. 217 art. XIX, 3 GAOR, U.N. Doc. 1/777 (1948).

58. *See, e.g.*, Filartiga v. Pena-Irala, 630 F.2d 876 (2d Cir. 1980), in which the court held that

> deliberate torture perpetrated under color of official authority violates universally accepted norms of the international law of human rights, regardless of the nationality of the parties. Thus, whenever an alleged torturer is found and served with process by an alien within our borders, § 1350 [of the Judiciary Act of 1789] provides federal jurisdiction.

Id. at 878.

59. For example, the ITU will bo holding conferences over the next several years on high frequency radio bands (1984 and 1986), the uses of geostationary satellite orbits, and the planning of space services (1985 and 1987). *See* Robinson, *supra* note 53, at 52-53. For a complete list of scheduled conferences see NTIA Roport, *supra* note 36, at 56-59.

III. The Global Satellite System for Information Transport—INTELSAT

The international satellite system known as INTELSAT is a major component in the international infrastructure for transborder data flow. INTELSAT provides a common carrier service to 170 nations; its transponders[60] transmit two-thirds of all international message traffic and virtually all live transborder television. The system's primary use is to transmit telephone traffic. INTELSAT is an intergovernmental agency with 108 participating member nations, second only in size to the international organization ITU, which has a membership of 154.[61] Treaties, conventions, or executive agreements govern the relationship between the participating members.[62] INTELSAT was the godchild of COMSAT, an organization set up under the Communications Satellite Act of 1962[63] to build a global satellite system. The global system has grown from eleven original participating member nations in 1964, whose use of world telephones constituted eighty-five percent of all telephone traffic. Long the leader and largest investor of the system, COMSAT now only has twenty-three percent ownership in INTELSAT.[64]

Satellite service INTELSAT has grown at a twenty-five percent per annum rate from 240 telephone circuits in 1964 to 60,000 today.[65] The price of leasing a full circuit has dropped from $64,000 to $9,360 per annum.[66] Today, the top users include newly industrialized countries like Brazil, Venezuela, Nigeria, Saudi Arabia, the Oil Emirates, and the member nations of the Organization

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60. "The equipment which receives a signal, amplifies it, changes its frequency, and retransmits it is called a *transponder*." J. Martin, *supra* note 48, at 281 (emphasis in original). Communication satellites typically contain several transponders. *Id.; see also* R. Galiardi, Introduction to Communications Engineering 127-31 (1978) (technical aspects of transponder system).

61. Because of an influx of members from the less developed countries, the ITU recently has grown from a relatively small organization of developed nations into the world's largest international organizations. *See* Rutkowski, *The 1979 World Administrative Radio Conference: The ITU in a Changing World*, 13 Int'l Law. 289, 293 (1979).

62. *See generally* J. Pelton, M. Perras & A. Sinha, INTELSAT, The Global Telecommunications Network (materials distributed at Pacific Telecommunications Conference, Jan. 16-19, 1983) [hereinafter cited as INTELSAT Conference] (structure, functions, and future of INTELSAT).

63. 47 U.S.C. §§ 701-44 (1976).

64. INTELSAT 1980 Annual Report 6 (1981).

65. Ahern & Greenberg, *Communications Satellites*, in Telecommunications in the U.S.: Trends and Policies 85, 86-87 (L. Lewin ed. 1981).

66. INTELSAT Conference, *supra* note 62, at 16, 21.

for Economic Cooperation and Development (OECD).[67] Although the heaviest use and financial support still comes from the developed nations, the vast majority of participants are developing countries.

The global satellite system has revolutionized the flow of communications traffic. Before the system, communications traffic traveled internationally by point-to-point cable facilities;[68] undersea cables interconnected only the wealthiest, most developed countries. Cables are not obsolete because they provide reliability, rednndancy, and security of transmission. The satellite service, however, provides multipoint rather than point-to-point transmission services. Since the system is distance and volume insensitive, small users do not suffer a penalty of higher tariffs,[69] and large and powerful nation users have no inherent advantage over the smaller and economically less developed countries.

Each country maintains its own national system and controls its own interconnection to the global system. Furthermore, a sovereign state may curtail only its own access to the system. Thus, INTELSAT is an independent, accessible global network open to all nations that choose to participate. Participants are not subject to the disruption of service at the whim of individual nations, unless, of course, a nation chooses to shoot down the satellite.[70] While the system is vulnerable to the few states that currently have the capacity to destroy satellites in orbit, the political consequences of such an action make it unacceptable public policy for any nation

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67. The OECD, established in 1961, promotes the economic and social welfare of its member states. Members in 1982 included Australia, Austria, Belgium, Canada, Deumark, Finland, France, West Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. WORLD ALMANAC AND BOOK OF FACTS 587 (1983).

68. Point-to-point communication facilities pass information incrementally from one station to the next. J. MARTIN, *supra* note 48, at 412. Thus, to send a communication from location A to D requires transmitting the message from A to B, from B to C, and then from C to D. With a multipoint network—like a satellite system—the A to D communication is accomplished with a single transmission.

69. With fibor optical cables the high speed and fidelity that data communications require may be available equally via land and sea.

70. M. Goldey, Aspects of International Voice Communications to and from the United States, A Working Paper of the American Bar Association Section on Science and Technology Project on International Data Networks Project 32 (to be published in JURIMETRICS J.). Reportedly, the State Department held discussions during the Iranian hostage crisis concerning methods of withholding television service from Iran to the United States. *See* Broad, *No Go for Satellite Sanctions Against Iran—A Presidential Proposal to Cut Off Iran's Access to the Satellites of INTELSAT Has Been Quietly Shelved*, 208 SCIENCE 685 (1980).

state.

Commentators have described INTELSAT as the most successful international organization and as an international organization that actually works.[71] The system, however, has not escaped criticism. Some of the less developed countries and less affluent users in developed countries have claimed that INTELSAT's low-powered, high orbit satellites require expensive, high-powered satellite saucers to gain access to the system, and thus exclude the poorer users. The Public Interest Satellite Association[72] in the United States has lobbied successfully for allocation of frequencies that could accommodate lower powered, low cost saucers.[73] Yash Pal, Secretary General of the Unispace Conference and former Director of the Indian Satellite Instructional Television Experiment (SITE), has urged a system of lower powered orbiting satellites, which might better suit the financial capabilities and informational needs of the developing nations.[74]

INTELSAT is responding to the criticisms of developing and less affluent users by establishing a "low-density telephony service" designed particularly to meet the needs of the Pacific Island nations.[75] The organization also has planned new business services to provide small, lower cost ground terminals for public and corporate users. These terminals will utilize five to eight meter earth stations installed at the users' places of business rather than large feeder satellite antennae that presently interconnect to the public

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71. *See* INTELSAT Conference, *supra* note 62, at 8.

72. The Public Interest Satellite Ass'n (PISA) is a public interest group whose function is to conduct research on the use of satellites for public purposes and to lobby for legislation favoring use of satellite technology to benefit the largest possible number of people.

73. A. Horowitz & W. Thomas, The Unexplored Option: Critical Choices For Public Telecommunications, 1977-2000 (1977) (working paper prepared under the auspices of the Public Interest Satellite Association); W. McGraw, Toward the Public Dividend (1977) (report commissioned by the Public Interest Satellite Association). For a discussion of the negotiations and claims of various national delegations concerning space options, see generally Robinson, *supra* note 53, at 18-28.

74. Address upon the occasion of the award of the International Marconi Fellowship, The Hague (June 12, 1982); *see* HOUSE COMM. ON FOREIGN AFFAIRS, 97TH CONG., 2d SESS., REPORT ON THE SECOND U.N. CONFERENCE ON THE PEACEFUL USES OF OUTER SPACE (UNISPACE 1982) 9 (Comm. Print 1983). The U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) organized Unispace '82 to review the state of space science and determine ways of improving its use through international cooperation. *Id.* at 1.

SITE was an experimental project in India for distribution of satellite signals on educational topics to remote villages. The project employed the American NASA satellite ATS-1.

75. INTELSAT Conference, *supra* note 62, at 39; *see* Address by Koji Imakita, Third Annual Pacific Telecommunications Council Seminar (June 7, 1982) (discussing how regional satellite communications should be arranged in terms of Pacific telecommunications).

networks. INTELSAT does not intend to allow potential competitors to overwhelm it; "eventually all communication services can be provided by INTELSAT in the framework of the global integrated services network."[76]

Thus, INTELSAT sees itself as a major—if not the sole—supplier of transnational information transport by satellite, and it is moving rapidly to meet the changing needs of users at both the high end and low end of the financial spectrum. The system is organizing to provide new telecommunications services, such as video conferencing; aeronautical, maritime, and land mobile services; business data; and possibly remote sensing data and direct broadcasting.[77] Nonetheless, INTELSAT recognizes that no international monopoly could or does exist, as long as alternative channels of communication via surface mail, undersea cables, or radio broadcasting continue to be viable.

The very existence of the INTELSAT system has facilitated greatly the transfer of information across international boundaries and proliferated the transfer of voice, video, and data communications. By 1986 INTELSAT expects to have satellites in orbit that are capable of transmitting the entire contents of the Encyclopedia Britannica or its equivalent across the face of the globe twenty times every minute, for the equivalent of 28,000 Encyclopedia Britannicas a day.[78] Clearly, the system provides a critical part of the infrastructure for transborder data flow.

IV. Global Networks of Transborder Data Flow

A number of systems have developed for international exchange of a tremendous variety of data. Some of these systems make use of INTELSAT as their means of transmission; others utilize cables and more traditional means. A review of several of these systems illustrates the wide range of data types that flow through global networks. An analysis of the legal issues concerning transborder data flow requires an awareness of the environment in which each of these global networks functions.

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76. INTELSAT Conference, *supra* note 62.

77. These goals for expanded service are consistent with INTELSAT's primary objective of "efficient provision, technologically and economically, of world-wide satellite communications." Snow, *INTELSAT: An International Example*, 30 J. Com. 147, 155 (1980).

78. INTELSAT Conference, *supra* note 62, at 17.

A. *Navigational Systems—MARISAT/INMARSAT*

One of the earliest recognized needs for satellite communications was for navigation. Maritime Satellite Communications (MARISAT) is a service that COMSAT General Corporation of Washington, D.C., originated in 1976.[79] Three satellites[80] provide links to ships at sea with interactive communications capability to computer networks and data bases. Not only does MARISAT meet navigational needs by satellite, but also seamen may make telephone calls. Ships may send telex transmissions and establish linkups with personal data bases; these data bases include computer games, electronic mail, and educational routines. Jacques Cousteau's famous research vessel Calypso has had access to MARISAT for over eighteen months and reports that both scientific and personal contracts have been greatly facilitated: "[I]t has changed our life on board ship."[81]

Today INMARSAT has taken over the three MARISAT satellites and also is leasing transponder space from INTELSAT. INMARSAT has thirty-seven member countries. The United States, the Soviet Union, the United Kingdom, Norway, and Japan hold the largest investment shares in the organization.[82] Olof Lundberg, Director General of the new system of INMARSAT, described its value and potential as follows:

> Inmarsat services mean that ships can he as easy to reach as offices on shore, and this can have a dramatic impact on the way they are managed, as well as on the quality of life enjoyed by ship's crews, and, most important of all, safety of life and property. . . . The potential for growth of mobile satellite communications is enormous. The world's merchant fleet consists of over 70,000 ships. The number at present fitted for satellite communications is about 1,000.[83]

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79. The members of the MARISAT Joint Venture include COMSAT General Corp., RCA Global Communications, Inc., Western Union International, Inc., and ITT World Communications, Inc. Martin & Lipke, *Performance of the MARISAT Communications System, in* MARITIME AND AERONAUTICAL SATELLITE COMMUNICATION AND NAVIGATION 1, 2 (1978).

80. For technical information about the three MARISAT satellites (named MARECS, MARISAT, and MAROTS), see COMPENDIUM OF COMMUNICATION AND BROADCAST SATELLITES: 1958 TO 1980, at 47-58 (M. Brown ed. 1981).

81. *On Line (in orbit) with MARISAT*, SOURCEWORLD, at 5.

82. *Maritime Communications Gets Boost from Inmarsat System*, COM. NEWS, Apr. 1982, at 40.

83. *Id.*

B. Financial Data

Not surprisingly, the banking industry has been most active in developing transborder data links. Indeed, in one of the earliest air travel data linkups, a Rothschild banker organized a private carrier pigeon service, which enabled him to obtain a competitive advantage in marketing securities through access to information about the defeat of Napoleon at Waterloo.[84] The reasons for the banking industry's interest in transborder data flow are apparent. Because banking is a system of mediation between borrowers and lenders of money, it is an information industry in which money itself is information, and the information content of all money transactions is high. The success or failure of a banking transaction depends largely upon the parties' knowledge about the political and economic environments in which the lending transactions take place. Thus, financial data carries considerable market value, and its successful use depends upon the speed and accuracy with which bankers can deliver it.

Most major banks now have worldwide networks for their own internal use and are interconnected through a special dedicated network.[85] Huge amounts of financial information still cross national boundaries by post, telex, and telephone, but increasingly, banking institutions transfer raw data in machine readable form in a stream of electronic signals recognizable only by a computer. Continental Illinois National Bank and Trust Company has been one of the leaders in establishing international data links. As early as 1980 Continental's European branches were transmitting computerized transactions data over leased lines to a central processing unit installed in Chicago. The branches were providing customers worldwide with their daily banking needs through a computer in the United States.[86]

Citibank's GLOBECOM, a network of leased lines that reach overseas branches in over 100 countries, is typical of today's banking networks. The GLOBECOM system passes more than 300,000 transmissions per month through computer switches in London, Bahrain, Hong Kong, and New York. Chase Manhattan Bank's

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84. Hamelink, *supra* note 33, at 21.

85. A dedicated network of this nature combines several specific communication circuits allocated solely to the specific bank's transmissions. C. SIPPL, *supra* note 29, at 123.

86. *International Data Flow: Hearings Before the Subcomm. on Government Information and Individual Rights of the House Comm. on Government Operations*, 96th Cong., 2d Sess. 112-139 (1980) (statement of Robert E. L. Walker, Vice President and Associate Corporate Council, Continental Illinois Nat'l Bank and Trust Co.).

private communications network reaches out from a cable and wireless computer in Hong Kong and an RCA computer in New York to branches in Piraeus, Rio de Janeiro, Jakarta, and other parts of the globe. Indeed, a global system of monetary exchange operates twenty-four hours a day.[87] Bankers perceive the efforts to inhibit the flow of information internationally as inimical to their business interests. Large international institutions in particular fear that measures which governments intend to limit transfer of other types of information will have a restrictive impact upon banking networks as well. According to a Citibank executive:

> Since the digital information flowing in cables or moving through space will be, in effect, a single, homogeneous stream, it will become increasingly impossible to maintain any of the traditional distinctions between transmissions carrying news, entertainment, financial data or even personal phone calls. This intermixing of data will make it impossible to pass laws restricting the transmission of one kind of information without impinging on all the others. Efforts to impede the flow of capital must inevitably lead to restrictions imposed on the flow of information and vice versa.[88]

In contrast, governing elites fear that the international movement of financial data will make it easier for banks and other international business institutions to escape the application of national laws regulating and taxing money transactions because these organizations will be able to manipulate electronically the situs of their funds. This fear has some validity. Banking institutions have threatened the very existence of the national money markets in their efforts to control national currencies in the same international trade transactions that gave rise to the Eurodollar.[89] Experts have estimated that approximately one trillion dollars have found refuge in a stateless pool of investment capital of "supermoney."[90]

Although transborder data flow has contributed to international trade, some critics believe that the use of new technology information transfer increases financial instability by disrupting the influence of nation states, either individually or collectively, over the international monetary system.[91] Thus, critics see an alteration of the balance of power not only between international financial institutions and their national governments, but also be-

87. Hamelink, *supra* note 33, at 24-25.

88. W. Sparks, Address at the Annenberg School of Communications Conference on World Communications (May 1980), *cited in* Hamelink, *supra* note 33, at 25-26.

89. Hamelink, *supra* note 33, at 27.

90. *Id.*

91. *Id.*

tween small and large banking institutions.[92] As larger institutions gain the ability to install sophisticated computerized information systems, they will obtain a competitive advantage over smaller banks that cannot make transfers as easily. Moreover, large institutions, which have access to an international information market when they deliver ancillary financial data and services—such as Chase Manhattan's economic data and econometric modeling services, which estimates show grossed $2.5 billion in 1978 and are growing at a thirty percent annual rate[93] have an advantage over smaller banks.

Thus, banking rapidly is becoming globalized. Two international financial data systems reportedly are interconnecting their services: CIDEL, which links fifty-one countries from headquarters in Luxembourg and handles stock transactions, and SWIFT, which links twenty-one countries from headquarters in Belgium and handles interbank transactions. Visa International president Dee Hock has warned bankers that events will overwhelm them if they remain rooted in past practices, because in the future banking institutions will deliver their services to customers wherever the customers happen to be.[94]

C. *Resources Management*

Remote sensing of the earth is another area in which the availability by satellite of computerized data about a nation outside its territorial boundaries causes concern to policymakers. For some years the nation states that lead the world in space technology commonly have been known to operate spy satellites. But this type of practice is acceptable and only disturbs ruling elites when it becomes public, for example, when the pilot of the American U-2 spy plane crashed over Soviet territory.[95] Nevertheless, some theoretical ferment has developed over whether these observational craft are violating airspace and whether the satellites are operating with the peaceful purposes that the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, requires.[96] Some

92. *Id.* at 26-27.

93. *Id.* at 23.

94. *Visa Warns Bankers Over New Technology*, 5 TRANSNAT'L DATA REP. 28 (1982).

95. For a contemporary discussion of the U-2 incident and its international implications, see Wright, *Legal Aspects of the U-2 Incident*, 54 AM. J. INT'L L. 836 (1960).

96. Outer Space Treaty, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205.

commentators argue that strategic reconnaissance should not be permissible except by the consent of the photographed country.[97] Arguably, however, the maintenance of a system of nuclear stalemate contributes to the "benefit and [is] in the interests of all countries" and nations should encourage it as long as the satellite photography causes no detriment to the photographed country. Technologically, most countries could not possibly exert national control over the space that extends above their territorial boundaries. The ability to control this space, however, one day might lead to greater wealth if space explorers are able to mine the resources of planets light years away. Hence, the notion of control by nation states over space may have a certain attraction in the long term.

The most controversial type of data recovery by satellite has been remote sensing of the earth's resources. LANDSAT 1, which the United States launched in July 1972, LANDSAT 2, launched in January 1975, and LANDSAT 3, launched in March 1978, orbit the globe about 575 miles above the earth and carefully scrutinize the planet in sections about 100 nautical miles wide. Photographs that LANDSAT cameras obtain can identify objects less than 100 yards in size. Within an eighteen day period the satellite can map the entire face of the globe—a rather startling economy compared with the years that Captain Cook spent mapping the Pacific Islands. In addition to gathering data extremely rapidly, LANDSAT produces accurate information and can prove, for example, that maps of the Amazon River were miles off course in the jungle areas of Brazil. Moreover, image processing through a computerized system of color correlation permits careful differentiation of certain features from others.

The speed, accuracy, and detail of the LANDSAT data production has suited it to many purposes. Users of the system can estimate crop acreage of wheat fields in the United States to an accuracy of ninety-five percent. The system has facilitated regional planning in the Phillipines by producing images of the Manila metropolitan area from 1972 to 1976 for comparison. A fifty-four percent increase in residential construction and a corresponding decrease of eighty-five percent in forested areas provides dramatic confirmation of the rapid urbanization of the Phillipines. In Pakistan the government used LANDSAT data to select promising

97. *See, e.g.*, D. Goedhuis, *Some Recent Trends in the Interpretation and the Implementation of the Rules of International Space Law*, 19 COLUM. J. TRANSNAT'L L. 213, 219-22 (1981).

sites for copper exploration. LANDSAT has improved greatly water resources management by allowing experts to monitor the monsoon rains to anticipate and thus diminish their adverse consequences.[98]

LANDSAT transmits the raw data it has gathered to the Earth Resources Observation Systems (EROS) Data Center, which the United States Geological Survey operates at Sioux Falls, South Dakota.[99] EROS processes the remote data and makes it available to purchasers all over the world at prices based upon reproduction costs. Although the prices of processed LANDSAT information are not negligible, they are modest compared to the research and development costs for the system itself, which developed as an offshoot of the United States investment in space technology.[100] The Reagan administration already has announced its intention to turn the processing of LANDSAT data over to the private sector.[101] The current market for LANDSAT products is quite small, however, about six million dollars annually, whereas estimates of the cost of operating the system range from one to ten billion dollars over a ten year period.[102] Although the American private sector would find such profit prospects unattractive, the French government has moved toward launching its own remote sensing satellite in 1984.[103]

Some nations have developed their own capability to receive and process the information directly from the LANDSAT satellite without the help of EROS. For example, the Brazilian Institute de Pesquisas Espaciais possesses its own processing unit. This unit has issued reports on oceanographic data, forestry and agronomy data, geographic data (including soil use, urbanism, and environmental impact), and geological data.[104]

Not all nations have been equally eager to use the EROS data, and many governments have questioned whether any nation has a legal right to sense via satellite the territorial area of a sovereign

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98. Umali, *Landsat: Uninvited Eye*, EAST-WEST PERSP., Winter 1980, at 12, 13.

99. Waldrop, *Imaging the Earth (II): The Politics of Landsat*, 216 SCIENCE 40, 41 (1982). For a discussion of the data collected by EROS and its uses, see Bylinsky, *EROS Puts the Whole Earth Under a Microscope*, FORTUNE, Feb. 1975, at 117.

100. The annual expenditure of the National Aeronautic and Space Administration is approximately $25 billion; the cost of a single map from EROS is about $45. According to a recent estimate, EROS could derive about $6 million in income annually. Waldrop, *supra* note 99, at 40.

101. *Id.* at 41.

102. *Id.* at 40.

103. *Id.* at 41.

104. Letter from René Antonio Novaes, Head, Remote Sensing Department of the Conselho Nacional de Desenvolvimento Cientifico e Tecnológico, to author (Nov. 24, 1981).

nation without its consent. Technically, a nation state would have difficulty prohibiting the space photography of its land mass because the technologically capable states merely could ignore a nation's legal restriction. Switching the satellite's camera lenses on and off at the request of the states below would be difficult, especially in areas where the nations are in close proximity. Furthermore, the sensing itself is harmless; the use to which the data is put creates the problems.

Nation states that are technologically unable to process LANDSAT data or financially unable to buy EROS information have been especially critical of the system because they believe it disadvantages them. Many third world nations feel unprepared to compete with the activities of nonnational business organizations that seek to develop natural resources or buy crops of these countries. Outsiders with access to EROS data may know more about the third world nations than the nations do themselves. Indeed, in early negotiations only Brazil claimed to require the consent of the state that the satellite sensed prior to photographing.[105] Even more controversial is the right of the sensed state to obtain the information related to its land mass or to require prior consent to dissemination of the data to third parties.[106] Whether a sensed nation can or should control the sensing, clearly it has an undeniable right under international law and traditional concepts of territorial sovereignty to control the natural resources found within its territorial jurisdiction.[107] The USSR claims that nation states have an inalienable right to control both their own natural resources and information concerning such resources.[108] The Japanese, however, have taken the position that remote sensing is not equivalent to taking the natural resources of another nation.[109]

The United States, which practices what it preaches on the issue of the right of sensed nations to control the flow of information about their territories, has made the data that it has collected from LANDSAT equally available to all nations. Without the abil-

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105. U.N. Doc. A/AC. 105/122 at para. 3 (1974). *See generally* Comment, *Earth Resource Satellites, a Puzzle for the United Nations*, 16 HARV. INT'L L. J. 648 (1975) (legal problems concerning sovereignty).

106. Umali, *supra* note 98, at 16.

107. Comment, *supra* note 105, at 650.

108. *See* U.N. Doc. A/AC. 105/C.2/L. 88, at paras. 4-5 (1973).

109. Umali, *supra* note 98, at 16. "The United Kingdom and a number of other West European nations agree with the U.S. and Japan, while the East European countries have joined the U.S.S.R. in pressing for restrictive measures." *Id.* at 17.

ity to analyze the data, however, access is not equal.[110] Many nations increasingly are becoming sensitive to the vulnerability that their dependence upon foreign sources for information about their own resources creates. If these nations permit their economies to become dependent upon satellite imagery, they may question the wisdom of permitting the service to remain indefinitely under the control of a single nation—the United States.[111] In the current American setting of budget cuts, however, increased United States investment in remote sensing is unlikely to aim at assisting developing countries to develop their own processing technology.

The continuing investment of developed nations in their own domestic satellites doubtless will cause the legal questions about remote sensing (RMS) to proliferate as more countries become capable of receiving and processing satellite images. The historical practice of the United States has been to transfer governmentally developed research capability to the private sector when the activity has become economically viable. The resolution of legal uncertainties, however, is necessary before private investors will commit their capital to developing the potential of RMS data for all users around the globe, both public and private.[112]

Some regional or global system of RMS data management and collection might be a solution to the legal problems that arise in this area. Surprisingly, approximately 120 nations, two-thirds of which are from the developing world, are investing substantial sums of money to develop computerized capability to utilize RMS data with little concern over the legal threat to the right to receive the data from its source—a United States controlled, NASA launched satellite system. Apprehension about the consequences, however, may be the source of a suggestion by a committee of the National Research Council that the American government should "declare soon that remote sensing systems constitute in effect an international public utility destined for international governance."[113]

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110. Comment, *supra* note 105, at 654.

111. *Id.* at 16.

112. Comment, *supra* note 105, at 656. For a discussion of the economic potential of this satellite data, see Bylinsky, *supra* note 99, at 130.

113. Umali, *supra* note 98, at 17.

D. Science and Technology Information—ARPANET, TELENET, CSNET, and VNET

Scientists consider uninhibited exchange of information across national boundaries to be essential to their work. Transfer of data subjects new discoveries and theories to the scrutiny of peers in other laboratories for verification or disproof. Scientific knowledge is cumulative—each scientist learns from the work of others. Open access to information stimulates creativity as scientists compete to be first in publishing research and discovering new areas of inquiry. Because no single country has a monopoly of scientific talent, communication among research scientists is international. Scientists historically have transferred scientific and technological information by hand, through oral communication, or through the mails by publication of scientific findings in journals. Scientists distribute and read over 2,000 scientific journals. The essential transnational nature of these publications is evident: American authors write only thirty-seven percent of the articles that appear in these journals.[114] Moreover, American researchers frequently cite foreign research results.[115]

Despite the desire of scientists to maintain free transfer of information, governmental interest in restricting information for national security purposes is increasing. This part of the Article focuses on the types of restrictions and regulations that the United States government places upon the transborder flow of scientific data. The United States government restricts transfer of scientific information to protect national security interests in five ways: (1) classification restricting access; (2) export control; (3) restrictions upon acceptance of federal funds; (4) voluntary agreements; and (5) control of foreign visitors. The categories of information eligible for classification include "scientific, technological, or economic matters relating to the national security"[116] and "cryptology."[117] A

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114. NATIONAL SCIENCE BOARD, SCIENCE INDICATORS 1980, at 17 (1981).

115. *Id.* at 18.

116. Exec. Order No. 12,356, 3 C.F.R. 166, 169 (1982).

117. *Id.* Cryptology in this context covers "all aspects of code work. . . ." J. Bamford, The Puzzle Palace: A Report on America's Most Secret Agency 29 (1982) (providing an in-depth description of the National Security Agency operations). Cryptology includes both the making and breaking of codes and currently is of great importance to national security institutions needing the latest application of scientific and technological theories to carry out effectively their eavesdropping and codebreaking operations. *See generally id.*

Cryptographic protection of communications transmissions via satellite relies upon the use of computer scrambling devices called cryptographic interference units (CIU). Each user of the satellite system connects at an access point termed a network security center. All

specific exemption exists for "[b]asic scientific research information not clearly related to the national security."[118]

Transborder transfer of scrutiny information occurs under a system that international agreements established through the Coordinating Committee for Multilateral Export Controls. The Committee is a voluntary organization for the consideration of trade controls on exports to the Warsaw Pact countries and the People's Republic of China. The group consists of all the NATO countries except Iceland and Japan. Only its member nation states, however, can implement its decisions.[119]

The federal government may restrict transfers of unclassified technical data under an export control system that consists of the Export Administration Act (EAA)[120] and the Arms Export Control Act.[121] The Export Administration Regulations (EAR),[122] promulgated by the United States Department of Commerce, implement the EAA, which governs the export of information that has both military and civilian applications. The EAA authorizes export controls to further national security, foster foreign policy, or protect the domestic economy from a drain of scarce materials.[123] The EAR control "technical data."[124] An export of this data occurs whenever one of the following events takes place: an actual transmission of data out of the United States, a release in the United States with the knowledge that the data will be shipped out of the country, or a release abroad.[125]

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transmissions pass through a CIU; only properly authorized locations on the system may receive the communication thereafter. *See* PROTOCOLS, *supra* note 30, at 369-429 (security in computer networks).

Interception of the satellite beam is feasible; the reception, however, is worthless unless a cryptoanalyst is able to break the code. Bamford, at 31-281. Thus, the restriction of access to a nation's cryptologic information is paramount to national security.

118. Exec. Order No. 12,356, 3 C.F.R. 166, 170 (1982). *See* National Academy of Sciences, Scientific Communication and National Security 28 (1982).

119. The United States established the Consultative Group-Coordinating Committee in 1945 to impose an embargo on the shipment of strategic technologies from the allied countries to the Eastern Bloc. COCOM's functions include preparing an international list of embargo items, processing requests for exceptions to the export list, and consulting on export control enforcement. T. ECKERT, THE TRANSFER OF U.S. TECHNOLOGY TO OTHER COUNTRIES: AN ANALYSIS OF EXPORT CONTROL POLICY AND SOME RECOMMENDATIONS 16-17 (Princeton University Center of International Studies Research Monograph No. 47, June 1981).

120. 50 U.S.C. §§ 2401-2420 (1976 & Supp. V 1981).

121. 22 U.S.C. § 2778 (1976 & Supp. V 1981).

122. 15 C.F.R. §§ 368.1-399.2 (1982).

123. 50 U.S.C. § 2402 (1976 & Supp. V 1981).

124. 15 C.F.R. § 379.1 (1982).

125. *Id.* § 379.1(b).

The International Traffic in Arms Regulations (ITAR)[126] of the United States Department of State effectuate the Arms Export Control Act, which addresses exports with strategic value. Any export of technical data requires prior approval and a license by the Office of Munitions Control in the Department of State.[127] No distinctions exist among various export destinations, except for Canada, to which this requirement does not apply. Although the categories of data transfer that are subject to ITAR are narrower than the categories that the EAR cover, the ITAR controls are broader reaching because of their geographical sweep. Both sets of regulations provide criminal and administrative remedies to punish violators of their rules.[128]

To export technical data the EAR require that the exporters either obtain a general license[129] or a validated license.[130] A general license is analogous to an exemption; it is effective automatically by force of regulation without an application or document authorizing the export. The general license is available for "[d]ata that have been made generally available to the public" through publications "that may be purchased without restrictions at a nominal cost or obtained without cost or are readily available at libraries open to the public" or through "open conferences."[131] The license is also available for scientific data that is not directly and significantly "related to design, production, or utilization in industrial processes."[132] A validated license, in contrast, authorizes a specific export of data. The Office of Export Administration of the Department of Commerce issues the validated license in response to a completed application form and a letter of explanation from the proposed exporter.[133]

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126. 22 C.F.R. §§ 121.01-130.33 (1982).

127. *Id.* § 125.20-.24 (1982).

128. *Id.* §§ 127.01-.10 (1982); 15 C.F.R. §§ 387.1-.14 (1982).

129. 15 C.F.R. § 371.1 (1982). Two types of general export licenses are available: the general license GTDA, which covers "[t]echnical data available to all destinations," *id.* § 379.3 (1982), and the general license GTDR, which covers "[t]echnical data under restriction," *id.* § 379.4 (1982).

130. *Id.* § 372.2.

131. *Id.* § 379.3 (a). Wilful violations of the export regulations subject corporations to penalties of five times the value of the export up to $1,000,000. Individuals are subject to penalties of up to $250,000, or as many as 10 years in jail, or both. 50 U.S.C. § 2410(b) (1976 & Supp. V 1981). Violators, however, more often are subject to administrative remedies such as seizure, forfeiture, or loss of export/import privileges. 50 U.S.C. § 2410(c) (1976 & Supp. V 1981). An aggressive effort by the Departments of Commerce and Treasury called "Project Exodus" has increased enforcement of the export regulations.

132. 15 C.F.R. § 379.3(b)(1) (1982).

133. *Id.* § 379.5.

In 1981 the Office of Export Administration processed over 73,000 applications for validated licenses.[134] Most of these requests were from industrial firms. Apparently, increasing control of technical data exports will result from changes in the agency's control system and from a growing concern in the intelligence community that these exports contribute to the competitive disadvantage that the United States is experiencing internationally.

In response to fears that America is losing its competitive advantage, United States policy is moving toward more sophisticated controls on transborder flows of technological data. In 1976 a Defense Science Board task force proposed that the export control system should shift its focus from the products themselves to the technology that is critical to design and manufacturing capability.[135] The report recommended that the export control system should place primary emphasis on (1) arrays of design and manufacturing knowledge; (2) "keystone" manufacturing, inspection, and test equipment; and (3) products requiring sophisticated operation, application, or maintenance ability.[136] The task force concluded that the American lead in critical technological areas was becoming increasingly difficult to preserve but that the United States could maintain its advantage in two ways: by denying the export of technology when it represented revolutionary rather than evolutionary advances, and by strengthening the export control laws in the United States and allied nations.[137]

In 1979 Congress incorporated into the EAR the defensive technology export policy that the task force had recommended.[138] Congress directed the United States Secretary of Defense to develop a list of militarily critical technologies; the list now covers a broad spectrum of technologies, including many with nonmilitary applications. The Arms Export Control Act and the ITAR control export of such strategic information.[139] The Secretary of Defense's list includes a category for "technical data" pertaining to the listed items. Like EAR, ITAR define the term "technical data" to include "any technology which advances the state-of-the-art or es-

134. U.S. DEP'T OF COMMERCE, ANNUAL REPORT OF THE SECRETARY FISCAL YEAR 1981, at 10 (1982).

135. DEFENSE SCIENCE BOARD TASK FORCE ON EXPORT OF U.S. TECHNOLOGY, AN ANALYSIS OF EXPORT CONTROL OF U. S. TECHNOLOGY—A DOD PERSPECTIVE (1976) (popularly called the Bucy report).

136. *Id.* at 3.

137. *Id.* at 14.

138. *See* 15 C.F.R. § 379 (1982).

139. 22 U.S.C. § 2778 (1976).

tablishes a new art in an area of significant military applicability in the United States."[140]

The United States government can regulate the transmission of technical data by means other than statutory controls.[141] As a major source of funds for university research the government apparently can impose restrictions on grant recipients to prevent communication of technical data. These restrictive stipulations in contracts may inhibit severely the free flow of transborder data from university and industrial research laboratories. This inhibited flow could impede the movement of information that scientists and researchers consider essential and limit the global interaction that stimulates innovation throughout the world.

Monitoring the flow of data from university research centers to ascertain whether to apply the various regulations is particularly difficult. Laboratory researchers create data flow networks using high speed data links, such as the ARPANET, a computer system that the United States Department of Defense developed in the early 1970's and funds as an experimental computerized environment for researchers on Defense Department contracts.[142] The original purpose of ARPANET was to promote load sharing among expensive computers at universities, but the system soon became the testbed for electronic mail and data exchange. TELENET, another computer system, had its origin in ARPANET concepts and provides packet switching services internationally.[143] Today

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140. 22 C.F.R. § 125.01 (1982); *see supra* text accompanying note 125.

141. In the United States the Constitution provides the most significant restraint on the government's ability to regulate technical communications. Scientific and technical communications generally appear to deserve at least some first amendment protection. *See* United States v. Edler Indus., 579 F.2d 516, 520-21 (9th Cir. 1978) (government interpretation of the scope of affected data in ITAR regulations impermissibly broad under the first amendment). The United States Supreme Court has stated clearly that the first amendment protects the right both to speak and to receive information. *See* Lamont v. Postmaster Gen., 381 U.S. 301, 307 (1965). In addition, the first amendment protects the right to communicate not only with other citizens but also with foreiguers. *Id.* The first amendment, however, does not invalidate all governmental controls on the flow of technical data. Moreover, the Supreme Court never has faced the first amendment rights of citizens beyond American boundaries. *See* Haig v. Agee, 453 U.S. 280, 308 (1981). Nor does the first amendment immunize communications concerning data that is an integral part of a transaction which the government has power to regulate. Traditional first amendment analysis applies a balancing test in which speech may be restricted if the governmental interest is sufficiently compelling.

142. Newell & Sproull, *Computer Networks: Prospects for Scientists*, 215 SCIENCE 843, 846-47 (1982); PROCEEDINGS, INTERNATIONAL CONFERENCE ON COMPUTER COMMUNICATIONS 273 (Oct. 27, 1980).

143. Crocker, Heafner, Metcalfe, & Postel, *Function-Oriented Protocols for the ARPA Computer Network*, 40 AFIPS Conference Proceedings 271 (1972), *reprinted in* COMPUTER

TELENET and its competitor, TYMNET, provide the communications support for a wide variety of information services through which scientists communicate internationally.

Other computer networks also transmit research data across national lines. In the United States, the National Science Foundation is funding the rapid growth of CSNET, which will connect to ARPANET and inevitably seek connection to information networks in other countries.[144] Scientists working for corporations use proprietary networks for research and development collaboration internationally. For example, the IBM Corporation's internal computer system, VNET, reportedly connects over 1100 computers in 150 major cities in 34 countries using leased lines for interconnection.[145] Not only does data exchange occur over this network, but also researchers can use it to collaborate on research and development. Data flow networks may make the conventional concepts of export control for technical data difficult to apply when the same idea emerges concurrently from scientists in several countries.

E. Other Global Networks

A number of other global data networks function today. These networks transmit a variety of data, which recipients desire for a broad spectrum of purposes. A brief survey of these networks, combined with the foregoing examination of the major avenues of transborder data flow, reveal the different settings in which legal issues concerning data transport can arise.

The weather satellite, NIMBUS, operated by The National Oceanographic and Atmospheric Administration, provides pictures of global geology, with weather fronts plotted and hurricane watches organized, to warn of meteorological disasters. The morning television news has changed radically with the advent of "real time" satellite pictures, which permit forecasters graphically to analyze on television monitors the rain clouds and sunshine. No inherent reason other than cost exists to prevent these weather pictures from being available worldwide via satellite directly to any point on the globe. The World Weather Watch uses some of the largest and most sophisticated computers in operation.[146]

COMMUNICATIONS 318 (P. Green & R. Lucky eds. 1975); Newell & Sproull, *supra* note 142, at 846-47. *See* HILTZ & TUROFF, *supra* note 1, at 138-39.

144. Newell & Sproull, *supra* note 142, at 851.

145. Telephone interview with George Kettell, manager of IBM's VNET project office (Nov. 3, 1983).

146. For a discussion of the use of "supercomputers" in meteorological forecasting, see

Another significant use of remote data recovery is a system called Remote Continual Verification (RECOVER). RECOVER is an international system of electronic devices that the 110 member nations of the International Atomic Energy Agency[147] currently are installing at 672 facilities. The system's primary surveillance devices detect hazards to safety in the use of nuclear installations and report to a central computer console in Vienna. Data transport occurs over hardwired dedicated lines, radio frequency transceivers, and data overlay on existing electric power lines. Scientists designed RECOVER to be reliable under adverse environmental conditions, timely in its reporting capability, simple, safe, and operable without human assistance.

The entertainment and informational uses of satellite systems are proliferating, primarily through the use of domestic satellites or by interconnection through the INTELSAT system. The global impact of instantaneous, worldwide distribution of television signals was most dramatic during the moon landing of July 20, 1969, only one week after the INTELSAT system became operational. Transmitting pictures for twenty-two hours of uninterrupted coverage required the cooperation and teamwork from four countries and one interstellar body. Following transmission of the picture from the surface of the moon to the space tracking station in the Red Center of Australia, the image went via INTELSAT to Jamesburg, California, then by NASA radio relay to Houston, Texas, from there via a Pacific satellite to Tokyo, via an Atlantic satellite to Goonhilly Downs in the United Kingdom and from there by the Eurovision network to participating national networks.[148] A truly global audience, estimated at 538 million, watched. Global audiences like this one now have become commonplace. Global weddings, as well as global funerals, take place with growing frequency. In addition, an estimated two billion viewers will see the 1984 Olympics.[149]

Other networks connect remote habitations with each other and with the rest of the world. For example, the PEACESAT net-

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Levine, *Supercomputers*, 246 SCI. AM. 118, 120 (1982).

147. The International Atomic Energy Agency, established in 1957, promotes the use of atomic energy for peaceful purposes and ensures that its offices do not further any military purpose. The agency is an autonomous international organization within the United Nations System. INTERNATIONAL ATOMIC ENERGY AGENCY, 20 YEARS INTERNATIONAL ATOMIC ENERGY AGENCY 1957-1977 1-9 (1977).

148. *See* INTELSAT Conference, *supra* note 62, at 17.

149. *Id.* at 31.

work in the South Pacific has involved the most extensive use of satellites. PEACESAT operated in an area of the South Pacific where islands are widely dispersed. The Indian Satellite Instructional Television Experiment (SITE),[150] the Canadian CTS, and the American ATS 3 and 6 satellites successfully have demonstrated educational and medical uses of communications in remote villages in India, Alaska, and the northern territories of Canada.

Although educational users of satellite systems are in an earlier stage of development than other users, educational uses are not primitive. Computer based education is developing slowly in the United States, and the systems have great potential for international networking between both developed and developing countries. The PLATO system of the Control Data Corporation (CDC) is one of the earliest educational prototype systems and among the most powerful. Permitting individualized instruction of a very sophisticated and highly interactive nature, the PLATO terminals are useful on site for everything from remedial education in schools to flight simulation for apprentice pilots. CDC also operates a network of more than fifty learning centers in cities around the United States and trains professionals around the world in a variety of specialties at its Institute of Advanced Technologies. CDC maintains very specialized data processing services for a broad range of scientific and engineering applications through its CYBERNET data base services, which are available throughout the United States and Canada and in twenty-four other nations. CDC is a full service remote data processing service and provides access to a complete range of specialized remote transactions, including credit verification, stock brokerage, computerized ticket purchases (TICKETRON), television viewing habits (ARBITRON), employment opportunities (CYBERSEARCH), bookkeeping for credit unions (FOCUS), and a global technology data base (TECHNOTEC).

CDC, however, like other remote data processors, has encountered difficulties in numerous countries in obtaining private leased lines to serve its remote customers worldwide. A variety of reasons motivate these refusals, including the desire of some nations to keep control of all data services and resulting revenue, and a national telematics policy to preserve data processing services for a local entity or nationally controlled subsidiary. Such policies may not be in the refusing nation's best interests, however, as Stephen

150. *See* Imakita, *supra* note 75, at 9.

Beach, Associate General Counsel for CDC, has observed: "Those countries that seek to impose barriers beyond legitimate self interests will fence themselves in as well as keeping others out. They will not obtain the world's technology or the data bases of information which they seek."[151]

V. Emerging Global Legal Issues

A. *Privacy*

As personal data increasingly has found refuge in the memory banks of large computers, concerns about the accuracy, accessibility, and use of this information have grown rapidly both in the United States and abroad. The United States has been the leader in enacting legislation to protect the privacy interests of individuals in personal data. Congress passed the Privacy Act of 1974,[152] followed by the Freedom of Information Act,[153] the Fair Credit Billing and Reporting Acts,[154] and, more recently, the Right to Financial Privacy Act.[155] Privacy legislation embodies principles of openness and disclosure about the existence of data banks and protects the rights of individuals to obtain, challenge, correct, or expunge inaccurate information.[156] The Privacy Act of 1974 mandated the creation of a Privacy Protection Study Commission, which conducted a major analysis of privacy policy.[157]

Since the mid-1970's, when European countries began to follow the American lead in protecting privacy interests, international organizations have noted that a patchwork quilt of different national laws—allegedly protecting the privacy of their nationals—could wreak havoc with the internal personnel management and information flow of transnational companies.[158] As the number of nations enacting such laws increases, international desire to harmonize these laws is strengthening.

The Organization for Economic Cooperation and Development

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151. S. Beach, Non-Tariff Trade Barriers—U.S. Response 3 (Aug. 10, 1982) (transcript of speech presented at the American Bar Association Annual Meeting).

152. 5 U.S.C. § 552a (1976).

153. 5 U.S.C. § 552 (1976).

154. Fair Credit Billing Act, 15 U.S.C. §§ 1601-1602, 1610, 1631-1632, 1637, 1666-1666j (1976); Fair Credit Reporting Act, 15 U.S.C. §§ 1681-1681t (1976).

155. 12 U.S.C.S. § 3401-3422 (Law. Co-op. Supp. 1982); 31 U.S.C.S. § 1051 (Law. Co-op. Supp. 1982).

156. *See* Privacy Protection Study Commission, Personal Privacy in an Information Society 501 (1977).

157. *Id.*

158. House Comm. on Government Operations, *supra* note 9, at 18.

(OECD) and the Council of Europe (CoE) have initiated efforts to develop guidelines[159] for harmonization of privacy protection laws among their member nations.[160] The provisions and force of the two groups' guidelines differ. Whereas the CoE Convention on privacy legislation is legally binding on signatory nations, the OECD guidelines are voluntary.[161] Little difference in effect may result, however, because both contain ineffective sanctions.[162] The CoE Convention is narrower and more specific than the OECD guidelines. It covers only automated data base information, while the OECD guidelines cover both automated and conventionally stored information.[163] Both sets of standards cover the public and private sectors; in contrast United States legislation addresses primarily federal agency, educational, and credit records of individuals.[164]

None of the rules discussed above protects the privacy of corporations, although several national legislative enactments do cover data banks operated by corporate entities. Surprisingly, not all transnational companies do not welcome protection of corporate information. Because a substantial part of a corporation's strategic planning may depend upon information about its corporate competitors, a company could suffer a disadvantage if its competitors could obtain access to this data.[165]

The CoE Convention contains several safeguards for transborder data flow that balance the privacy protections which otherwise might inhibit the movement of information. First, the Convention prohibits signatories from disallowing transnational flows

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159. The CoE proposed the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data, TRANSNAT'L DATA REP., Vol. 3, No. 6, at 17 (1980). The OECD put forth the Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data, TRANSNAT'L DATA REP., Vol. 4, No. 1, at 45 (1981).

160. The membership of the two groups is quite similar. CoE bas twenty members, only three of which—Cyprus, Luxembourg, and Malta—are not members of OECD as well. Of the twenty-four members of OECD, only six are not in the European Economic Community (Australia, Canada, Finland, Japan, New Zealand, and the United States). OECD AT A GLANCE (1982). Every nation in the two groups has privacy legislation or is considering recommendations for legislation by privacy commissions. *See* Patrick, *Privacy Restrictions on Transnational Data Flows: A Comparison of the Council of Europe Draft Convention and the OECD Guidelines*, 21 JURIMETRICS 405, 406-08 (1981).

161. Patrick, *supra* note 160, at 407.

162. Member nations usually follow these rules, however, as a matter of convenience. Coombe, *Multinational Codes of Conduct and Corporate Accountability: New Opportunities for Corporate Counsel*, 36 BUS. LAW. 17 (1980); Patrick, *supra* note 160, at 419.

163. Patrick, *supra* note 160, at 408.

164. Patrick, *supra* note 160, at 420.

165. Maisonrouge, *Regulation of International Information Flows*, 1 THE INFORMATION SOCIETY 17, 22 (1981).

solely upon the grounds of privacy protection. Second, it admonishes member nations not to create obstacles to transborder data flows that exceed requirements for privacy protection. Third, the Convention requires members to take reasonable steps to ensure uninterrupted and secure transit of data through member countries. Last, the rules urge nations not to obstruct transborder data flow unless the domestic legislation of another nation does not provide equivalent privacy protection and hence no danger exists of circumventing that country's laws. The Convention forces a harmonization of national privacy laws.[166]

A prime motivating force behind the CoE efforts to preserve transborder data flow freedom and equalize national privacy laws is the knowledge that the European Economic Community's largest unexploited opportunity is to develop the combined market of its member states to provide a competitive environment equal to or better than the one that historically has been available to large corporations in the United States. Thus, the harmonization of privacy legislation is part of the Community's attempt to expand the "teleinformatics" industry to provide a foundation of economic growth and development in the region.[167]

B. Criminal Action

Because banks have been at the forefront of computerization and traditionally have attracted embezzlers and other avaricious and enterprising individuals, financial transactions, not surprisingly, have become the target of computer pirates. The most notorious case is that of *United States v. Rifkin*,[168] which concerned an international interbank transfer. Rifkin was an employee in the "wire room" of Security Pacific National Bank of Los Angeles. The wire room is the hub of a computerized system that transfers two to four billion dollars of funds every day. By manipulating this system, Rifkin successfully transferred $10.2 million through the Irving Trust Company in New York to the Wozchod Handels Bank in Zurich, Switzerland, and later reduced the proceeds to the contents of an ashtray overflowing with Russian diamonds. Rifkin was apprehended, tried, and sentenced to eight years in federal prison, despite a plea by his attorney that the authorities should permit

166. Patrick, *supra* note 160, at 417.

167. Ramsey, *Europe Responds to the Challenge of the New Informations Technologies: A Teleinformatics Strategy for the 1980's*, 14 CORNELL INT'L L.J. 237, 245 (1981).

168. No. CR 78-1050-WMB (C.D. Cal.).

this computer genius to remain free as a consultant to businesses that needed his expertise to devise security systems which other computer thieves could not invade electronically.[169]

Society has not punished all acts of computer piracy as it did Rifkin's crime. Unauthorized invasions of computerized systems have outdistanced the attempts of American legislators to keep up with the technological opportunities for criminal behavior. As recently as 1974 only forty-two percent of the states had effective legislation prohibiting theft of computer software and only twenty-four percent had legislation concerning theft of computer time.[170] In addition, the press tends to glorify the actions of computer thieves.[171] Perpetrators of this type of crime have been successful in establishing themselves as advisers to the very institutions from which they have taken computer time, or altered or pirated data.[172]

As micro and minicomputers proliferate and interconnect over various information transport systems, the opportunities for embezzlement of electronic funds in the process of transfer, piracy of proprietary signals or services, and deliberate damage to persons or property from the alteration of data will increase exponentially. To ensure a global environment in which the transfer of data can take place securely, without alteration or diversion between users, legislatures must develop laws prohibiting computer crimes. These laws must be compatible and enforceable regardless of the locus of the crime, because the embezzlement, distortion, destruction, or otherwise unauthorized use of data may occur in outer space or within a radio frequency band at high altitudes where sovereign rights and responsibilities may be very cloudy indeed.

C. Contract and Tort Liability

Together, contract and tort liability are one of the most volatile and interesting areas for legal development in the transborder data flow field. No great body of case law on tort liability in the transborder data flow area yet exists, but the potential for unintentional torts increases as people use computers more widely both at home and abroad.[173] For example, computers can cause physical

169. Bloombecker, *Rifkin, A Documentary History*, 2 COMPUTER L.J. 471 (1980).

170. D. PARKER, S. NYCUM, & S. OURA, COMPUTER ABUSE (Stanford Research Institute 1975).

171. Bloombecker, *The Trial of a Computer Crime*, 21 JURIMETRICS 421, 429 (1981).

172. *See* NEWSWEEK, Sept. 5, 1983, at 45.

173. How the American judiciary will adapt its tort principles to cases concerning electronic transfers is unclear. In Evra Corp. v. Swiss Bank Corp., 673 F.2d 951 (7th Cir. 1982),

damage: malfunctioning systems can endanger medical patients; erroneous input or processing can injure credit ratings, endanger air transportation, or unleash a debt collector against a citizen whose payments are timely.[174] One court has awarded damages of over $200,000 for unfair competition stemming from unauthorized remote access to a data bank.[175]

Some business organizations potentially may become liable for failure to use computer services—technological "nonfeasance"—in addition to misuse of these services. This situation would be comparable to the cases holding tugboats negligent for not using their radios. International regulations that require ships at sea to have available radio transmitters and to keep their receivers open on a specified channel to ensure the safety of all navigable vessels[176] also are analogous; the failure of a crew to use these transmitters would be negligence.

Another basis of litigation may be the defendant's reliance upon a computer when human judgment should have intervened. In an unforgettable Ford Motor Credit Company case a computer error caused the company to repossess an automobile that belonged to a customer who had been making his payments quite promptly.[177] As electronic videotext and videotext begin to provide traditional news and information services directly to home terminals, opportunities for tortfeasance, such as defamation or libel, will arise. The problems will be especially thorny as distributing networks permit increasingly large numbers of entrepreneurs access to the information distribution system worldwide. Questions about insurability and risk assessment in a global information environment containing a multiplicity of user networks may inhibit

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the Seventh Circuit Court of Appeals considered a case in which Swiss Bank Corporation failed to transfer $27,000 that an Illinois bank had telexed, intending the money to be payment for the lease of a vessel. The District Court had held that Swiss Bank Corporation had been negligent in its failure to make the payment and assessed damages of $2.1 million. Evra Corp. v. Swiss Bank Corp., 522 F. Supp. 820, 829, 835 (N.D. Ill. 1981). The Seventh Circuit reversed, noting that the plaintiff should have known "that messages sometimes get lost or delayed in transit . . . even when all the banks are using reasonable care." 673 F.2d at 957. The sharp disagreement between the district and circuit courts in this case highlights the potential for a conflict between the circuits as more of these cases arise.

174. R. BIGELOW & S. NYCUM, YOUR COMPUTER AND THE LAW 136 (1975).

175. For a discussion of the unreported decision in *People v. Ward*, a California municipal court case, see Bloombecker, *supra* note 171, at 423-24.

176. Agreement for the Promotion of Safety on the Great Lakes by Means of Radio, Dec. 19, 1978, United States-Canada, 30 U.S.T. 2523, T.I.A.S. No. 9352.

177. Ford Motor Credit Co. v. Swarens, 447 S.W.2d 53 (Ky. Ct. App. 1969) ("Trust in the infallibility of a computer is hardly a defense.").

the development of such a diverse information marketplace. Liability is far simpler to assess within a system in which corporations and public networks assume responsibility for the content of the information as well as for the management of the information transport system.

D. Proprietary Rights in Information

> [I]s information on the international level an intellectual asset which belongs to the whole of humanity or is it also a marketable asset?[178]

In economic terms, data flow obviously will slow down if no market value exists for the offered information products and services. Because the monetary value of information is of key importance in the market, a clear delineation of the rights in intellectual property is necessary when the international marketplace is concerned. Unfortunately, substantial misunderstanding and disagreement may arise about the value of information. The economics of information is a new and underdeveloped discipline, although some scholars have made notable efforts to remedy that situation.[179]

Historically, a paradox has existed between the promotion of progress through wide dissemination of knowledge and the protection of the economic interests of those who contribute to the development of new knowledge. The founders recognized this conflict of interests, and the Constitution purports both to "promote the Progress of Science and useful Arts"[180] and to protect the proprietary rights of artists, writers, and inventors through a system of copyright and patent protection. Thus, one strand of United States policy long has recognized the contribution of the free flow of ideas to innovation and productivity. This causal relationship has not escaped the notice of developing countries,[181] which may desire a freer flow of data into their hands. Determining the kind of information flows that government should refuse to inhibit and the costs associated with technology transfer is troublesome in a global context.

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178. Lemoine, *supra* note 23.

179. *See, e.g.*, ECONOMICS OF INFORMATION AND KNOWLEDGE (D. Lamberton ed. 1971); F. MACHLUP, THE PRODUCTION AND DISTRIBUTION OF KNOWLEDGE IN THE UNITED STATES (1962); Arrow, *The Economics of Information*, in THE COMPUTER AGE: A TWENTY YEAR VIEW (M. Dertouzos & J. Moses eds. 1979); O'Brien & Helleiner, *The Political Economy of Information in a Changing International Order*, 34 INT'L ORG. 445 (1980); Wunderlich, *Property Rights and Information*, 412 ANNALS 80 (1974).

180. U.S. CONST., art. I § 8, cl. 8.

181. Feldman, *Commercial Speech, Transborder Data Flows and the Right to Communicate under International Law*, 17 INT'L LAW., 87, 87-88 (1983).

The question of the applicability of the present system of copyright, patent, and trademark protection to the new forms of information also is disconcerting. Substantial evidence exists that legal distinctions developed for the printing press and the copies imprinted in a permanent form simply do not protect adequately the interest of participants in the dynamic electronic environment. New rules may be necessary when "authors" are in various locations contributing their intellectual input either simultaneously or consecutively into a "work product" that may never be fixed or permanent.

Professor Pool and Mr. Solomon have noted the difficulties associated with protecting proprietary rights in electronic information:

> First, liability is incurred neither at input nor at output, but within the computer network. Second, what protects the author or publisher is physical control of the text for there is no count of its reproduction once it is out of his hands. Third, a billing system operated by the network is necessary if fee collection is to be easy. Without that there is too much red tape in making arrangements for occasional access. Fourth, once the publisher's text has been read by someone else, evasion of royalty payments is quite easy because the reader can store the text in his computer and do whatever he wants with it. Computer copying is even easier than photocopying.[182]

Observing that "[e]very reading of computer output requires the regeneration of it; every reading is a printing,"[183] Professor Pool and Mr. Solomon warn that traditional legal protection may not be adequate to protect proprietary rights in information. The peril, they note, is particularly great in the new international trade environment in which "[i]nformation in a pure form is one of the newest private industries."[184] These scholars, however, see premature conventions or legislation as impediments to innovation in the development of information systems and suggest that the wiser course is to consider the legal problems of transborder data flow primarily as international issues.[185] Thus, the priority concerns in legal development should be to delineate what constitutes computer fraud, abuse, negligence, breach of contract and to provide mechanisms through which such grievances may be redressed.[186]

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182. *Id.* at 123.
183. *Id.* at 121.
184. *Id.* at 133.
185. *Id.* at 136-39.
186. *Id.* at 137-38.

E. Ownership of and Access to Information

Another thorny legal question concerns the ownership or right to lease transmission systems and the right of the owner, lessor, lessee, or user of the system to control the content of the message transmitted. Historically, legislation in the United States has segmented different types of transmission services and endowed each one with a distinct regulatory system. At least seven models of regulation for various data transmission systems exist. The continued usefulness of any of these models or their hybrids as transborder data flow becomes increasingly sophisticated is uncertain. Lawmakers may change radically or even discard some of these models. Nevertheless, these paradigms provide necessary starting points in the development of the legal environment for transborder data flow. They are as follows:

(1) The print media is a virtually unregulated system. The first amendment tolerates no licensing of entry into the print media.[187] No right of reply exists, and the right of access to the print pages or to the newspaper columns is not legally enforceable.[188]

(2) Broadcasting is a regulated system in which the government licenses radio broadcasters to transmit on a given frequency. The broadcasters must monitor the content of their transmission for certain objectionable material. The regulations also require them to be trustees of the public interest, to ensure that broadcast content is fair, and to permit individuals as well as groups to reply to personal attacks and questions of public controversy.[189] Nevertheless, no mandatory right of access to the broadcasting system exists, except to candidates for federal office.[190]

(3) For telephony the government has applied a common carrier policy,[191] in which the carrier must accept all messages without

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187. Lorain Journal Co. v. United States, 342 U.S. 143 (1951); Associated Press v. United States, 326 U.S. 1 (1945).

188. Miami Herald Publishing Co. v. Tornillo, 418 U.S. 241 (1974).

189. 47 U.S.C. §§ 301, 315 (1976). *See generally* Red Lion Broadcasting Co. v. Federal Communications Commission, 395 U.S. 367 (1969) (fairness doctrine).

190. 47 U.S.C. § 312(a)(7) (1976); Columbia Broadcasting Sys., Inc. v. Democratic Nat'l Comm., 412 U.S. 94 (1973).

191. Traditionally, a common carrier is one who undertakes for hire to transport the goods of those who may choose to employ him from place to place. He is, in general, bound to take the goods of all who offer. . . . When he receives the goods, it is his duty to take all possible care of them in their passage, make due transport and safe and right delivery of them. . . . At common law, a carrier . . . is in the nature of an insurer.

Niagara v. Cordes, 62 U.S. (21 Howard) 7, 22 (1858). *See generally* L. GORTON, THE CONCEPT OF THE COMMON CARRIER IN ANGLO-AMERICAN LAW (1971) (an exhaustive examination

censorship or carrier interference except in the cases of obscenity or personal harassment.[192] A virtual monopoly at the national level and a regulated monopoly at the local level traditionally have controlled the transmission of vocal messages. The recent deregulatory actions of the Federal Communications Commission and pressure from the antitrust division of the Department of Justice, however, have led to a more open competition in the interstate voice message transmission system, with only the local operating company retaining a monopoly.[193]

(4) For magazines, newsletter and direct mail solicitations the system is in part regulated and in part free of regulation. The postal service is a common carrier but the contents of the publications that the postal service transmits are not subject to regulation unless the material is pornographic or so personally offensive that recipients may prohibit delivery by filing a special form with the local post office.[194]

(5) Record carrier services have been an oligopoly. Western Union has provided the domestic telegraph services, and a group of five international carriers have divided the international traffic through authorized gateways that interconnect to the domestic public switched network.[195] Telegraphy has operated under mandatory common carrier principles, and has permitted no censorship or monitoring of the content. In recent years, however, telegraph and international telex services have become more competitive. Western Union now may provide international services, and the international record carriers may have direct access to domestic customers without going through an authorized international gateway.[196]

(6) A hybrid regulatory system operated traditionally for cable

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of the development of the common carrier's status as a link between public and private law).

192. 47 U.S.C. §§ 201, 202, 223 (1976).

193. Consent Decree in United States v. AT&T, Nos. 74-1698, 82-0025 (D.D.C. Jan. 8, 1982); Modification of Judgment in United States v. AT&T, Nos. 74-1698, 82-0025 (D.D.C. Aug. 24, 1982). *See generally* PRACTICING L. INST., AFTER THE AT&T SETTLEMENT, THE NEW TELECOMMUNICATIONS ERA (1982).

194. Rowan v. United States Post Office, 397 U.S. 728 (1970).

195. 47 U.S.C. § 222 (1976 & Supp. V 1981).

196. Int'l Record Carrier's Communications, 58 F.C.C.2d 250, 254 (1976); *see also* Regulation of Domestic Public Message Service, 75 F.C.C.2d 345, 382 (1980) (statement of Charles D. Ferris, Chairman); *The International Record Carrier Competition Act of 1981: Hearings on S.271 Before the Subcomm. on Communications of the Sen. Comm. on Commerce and Science*, 97th Cong., 2d Sess. (1981). *See generally* D. SCHILLER, *supra* note 8, at 151-68.

television.[197] A common carrier policy applied to some of the early leased channels. Hence, the channels had to broadcast nearly all material without censorship unless the contents were obscene or harrassing. The locally originated channels, in contrast, followed the broadcast model, and the pay services, a third form of cable television, operated on the model of the print media. The courts, however, recently have questioned the authority of the Federal Communications Commission to make decisions about ownership of and access to cable systems. Consequently, authorities at the city or state level now must make these decisions.[198]

(7) Satellite services operate under an "open skies" policy domestically[199] and through a quasi-monopoly carrier, INTELSAT,[200] internationally. The difficult legal problems in satellite services arise in video publishing of text on the television screen either by broadcast or by telephone. Major questions, of course, concern which model of ownership and access applies to these services. Within the ISDNs,[201] which digitalize and transmit all the different satellite signals in a single jetstream, the problem is particularly acute. Typologies that relate to allocations of different frequencies are very awkward to apply to satellite transmissions. If broadcasters provide text from the satellite transmission—the system called teletext—government could regulate this service according to the broadcast model. If the telephone company provides the text—videotex—then a common carrier system of regulation might be most appropriate. No model, however, is obviously best either for teletext or for videotex.[202] Prestel, a videotex service in the United Kingdom, operates on the print model; hence information providers have complete control over satellite messages that they transmit by the telephone system. Broadcasters in this country, in contrast, tend to claim control over text imbedded in their transmissions, even though the Federal Communications Commission could allocate the service to a different owner and operator for the purpose both of ownership and of control over the message.[203] The distinction is most problematic in a situation in which a newspaper

197. 36 F.C.C.2d 143 (1972); *see also* 47 C.F.R. § 76 (1982).

198. Midwest Video Corp. v. FCC, 571 F.2d 1025 (8th Cir. 1978) *aff'd*, 440 U.S. 689 (1979).

199. *See* Domestic Communications-Satellite Facilities, 35 F.C.C.2d 844 (1972).

200. *See supra* notes 60-78 and accompanying text.

201. *See supra* note 31 and accompanying text.

202. *See* Neustadt, Skall & Hammer, *The Regulation of Electronic Publishing*, 33 FED. COM. L.J. 331 (1981).

203. *Id.* at 367.

provides the service over a broadcast or telephone system, because the newspaper is operating only as an information provider through a cable, broadcast, or telephone system rather than as the distributor of information in its traditional print mode.

The legal status of newspapers as information providers and owners of the new technological systems of delivery is unclear. Nor have lawmakers determined what rules should apply to remote computer service vendors that operate videotex services over private leased lines. The unanswered questions become even more difficult if the sources of the information provided through the electronic data service originate simultaneously from newspapers, broadcasters, and common carriers, as well as from independent information providers that have had no previous history with any of the currently recognized service modes.

F. An Emerging Legal Right to Communicate

Interest is growing in the idea of establishing a legal right to communicate across national boundaries—a right that would be independent of national authorities. This legal right would be tenuous at best, however, because no legal forum exists in which to adjudicate it, and no independent authority exists to enforce it. At present, the protection of basic human rights, including the right to communicate, falls under the protective cover and responsibility of the nation state to which the citizen who claims such rights has allegiance. Nevertheless, some hopeful signs have appeared that basic human rights may become universally recognized and litigable in courts other than those of the nations in which derogation of the rights occurs.[204]

Several international intergovernmental documents recognize rights to communicate freely across national boundaries. The oldest document is Article 19 of the Universal Declaration of Human Rights, which states: "Everyone has the right to freedom of opinion and expression; this right includes the freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers."[205] An American court has acknowledged that the declaration has universal validity and that the right is exercisable in a court of law

204. Filartiga v. Pena-Irala, 630 F.2d 876, 883-85 (2d Cir. 1980); *see supra* note 58 and accompanying text.

205. G.A. Res. 217, U.N. Doc. A/810, at 71 (1948).

other than a court of the nationals who claim the right.[206] Sixty-nine nations have entered into treaty obligations under the International Covenant on Civil and Political Rights,[207] a document that contains wording which is almost identical to the language of the Universal Declaration of Human Rights.[208] In addition, the ITU[209] has recoguized "tlie right of the public to correspond by means of international services of public correspondence."[210] Various treaties of friendship, commerce, and navigation have established the rights of nationals of treaty countries reciprocally to "communicate freely with other persons inside and outside such territories by mail, telegraph, and other means open to general public use."[211]

The organizations and nation states that have recognized the right to communicate, however, generally have intended to accord this right to members of the public for public correspondence and to journalists for dispatching their stories to the print, audio, or video media. Whether the signers of these statements intended the right to extend to the transfer of information via computer for commercial or other purposes is not clear. Authorities certainly could read the words of international documents to imply this electronic age meaning. Furthermore, the interests of major trading nations dictate establishment of these rights in the interests of a healthy global economy. The likelihood of an unambiguous declaration of the right to electronic communication, however, is small; even if organizations and nation states recognized the right they would clothe it in so many exceptions and ambiguities that any nation state desiring to do so could easily circumvent its enforce-

206. *See supra* note 58.

207. 21 U.N. GAOR Supp. (No. 16) at 52, U.N. Doc. A/6316 (1966). United States adherence to the Covenant is not fully established, since the United States Senate has not yet ratified the President's signature. *See* Henkin, *Rights: American and Human*, 79 COLUM. L. REV. 405, 421-24 (1979).

208. The pertinent language in the Covenant is: "Everyone shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print, in the form of art, or through any other media of his choice." 21 U.N. GAOR Supp. (No. 16) at 52, art. 19(2), U.N. Doc. A/6316 (1966); *see* Feldman, *supra* note 181, at 87 ("The author believes a right to communicate already exists under international law that embraces . . . transborder data flows.").

209. *See supra* notes 47-59 and accompanying text.

210. International Telecommunication Convention, Oct. 25, 1973, 28 U.S.T. 2495, T.I.A.S. No. 8572.

211. Treaty of Friendship, Commerce and Navigation, United States-West Germany, Oct. 29, 1954, art. II(4), 7 U.S.T. 1839, 1842, T.I.A.S. No. 3593.

ment. The ITU regulations,[212] for example, reserve the rights of member nations to suspend services or to interfere with specific transmission if security, public order, or morality dictates.[213] Furthermore, the Universal Declaration of Human Rights permits curtailment of the right to receive and impart information if other, higher, human rights are in jeopardy or if considerations of "morality, public order, and the general welfare in a democratic society" carry higher priority.[214]

Notwithstanding the current state of international law concerning the enforceability of human rights, international public opinion is a powerful deterrent to aberrant behavior. New telecommunications technologies may help advance the state of the law. They may make national boundaries more permeable. Arthur C. Clarke puts great faith in the ability of satellite communication to reform human conduct:

> The very existence of the myriads of new information channels, operating in real-time and across all frontiers, will be a powerful influence for civilized behavior. If you are arranging a massacre, it will be useless to shoot the cameraman who has so inconveniently appeared on the scene. His pictures will already be safe in the studio five thousand kilometres away; and his final image may hang you.[215]

Although the communication rights that international groups recognize admittedly are tenuous, nevertheless, including transborder data flow within the purview of these rights is preferable to the present lacuna in international law in which nation states seem to see transborder data flow regulations as within their power to enact. As Feldman and Garcia have noted, the friendship, commerce, and navigation treaties that recognize a right to exchange information do not include a right to operate communications facilities within a country.[216] Thus, these treaties provide no help in gnaranteeing access to leased lines to establish data processing services that the state operated PTTs do not offer.[217] This lack is a source of major concern for both service providers and major trans-

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212. *See supra* notes 211-12 and accompanying text.

213. International Telecommunication Convention, Oct. 25, 1973, art. 19, 28 U.N.T.S. 2495, 2525, T.I.A.S. No. 8572.

214. G.A. Res. 217, U.N. Doc. at art. 29, A/810, at 77 (1948).

215. Address by Arthur C. Clarke, Telecommunications Day, United Nations (May 17, 1983) (entitled "Beyond the Global Village").

216. Feldman & Garcia, *National Regulation of Transborder Data Flows*, 7 N.C.J. INT'L L. & COM. REG. 1, 8-10 (1982).

217. Post, Telephone and Telegraph Administrations (PTTs) are state owned and operated telecommunications agencies.

national corporations that use transborder data flow.[218] Furthermore, a right to transmit transborder data flow over the public switched network of a host country would depend upon exclusion of these data services from the definition of "domestic communications." Domestic communications are transmissions that a nation state deems sensitive and excludes from both reciprocal "national treatment" and from most favored nation treatment.[219] The United States has suffered for over a decade from the problems inherent in trying to rid its regulatory processes of the distinction between computer and communications services.[220] This distinction has resulted in the more recent dichotomy between basic (traditional and regulated) and enhanced (computerized and unregulated) services.[221] Fortunately for transnational companies, substantial movement is occurring in some of the more developed nation states to open up "enhanced" or computerized, communications services to competition.[222] If the competition includes nounational service providers, a more open international market for transborder data flow could develop.

Nonetheless, the absence of international and domestic law on the subject forbodes substantial arguments and litigation until the formulation of some internationally recognized principles. A great need exists to develop a taxonomy of information that will establish priorities among types of information for the application of either a regulatory or a free access mode. Uninhibited access would apply to international communications facilities, but the taxonomy would grant a lower priority to information whose very sensitive nature indicates the necessity of substantial controls.[223] The uninhibited-access class would include internal transborder data flow

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218. Fishman, *supra* note 3, at 14-15.

219. Feldman, *supra* note 181, at 94.

220. The United States Federal Communications Commission defines "basic transmission services" as "pure transmission capability over a communications path that is virtually transparent in terms of its interaction with customer supplied information," Second Computer Inquiry, 77 F.C.C. 2d 384, 420 (1980), Reconsideration Order, 84 F.C.C. 2d 50 (1980), Further Reconsideration Order, 88 F.C.C. 2d 512 (1981).

221. The Federal Communications Commission considers "enhanced services" to be "all services offered over common carrier transmission facilities used in interstate communications, which employ computer processing applications that act on the format, content, code, protocol or similar aspects of the subscriber's transmitted information; provide the subscriber additional, different, or restructured information; or involve subscriber interaction with stored information." Computer II Implementation Proceeding, 89 F.C.C. 2d 694, 694 n.1 (1982).

222. Fishman, *supra* note 3, at 15.

223. *See* Novotny, *supra* note 19, at 141.

within transnational companies, private correspondence of individuals, diplomatic correspondence, journalistic reports, and health and weather data. The more restricted class would contain strategic, intelligence, and criminal data. The most problematic categories of information are the ones that highlight transnational variations in public morality and relate to the transfer of technology. For example, although established procedures exist for rejecting foreign films that are palatable to general audiences in the United States but offensive in other nations,[224] no technical method exists for accommodating these concerns when the information is transmitted in a merged digital bit stream.

G. *Concepts of Territoriality*

Legal concepts that concern different types of geographical areas vary considerably. For example, the law of the sea historically has opened maritime areas to all compatible users; the law of physical land masses, however, has developed with a basic concept of territoriality.[225] Laws concerning air space have been a compromise between land and sea law,[226] but the line between territorial exclusivity and shared use in airspace remains unclear. Some legal commentators have urged the use of the Von Karmann line, the threshold beyond which dynamic lift no longer is maintainable.[227] The point at which a space satellite can sustain a stationary orbit or the point of gravitational neutrality would be equally valid, however, as would the distance beyond which a nation state cannot shoot down an object flying over its territory. This "shooting range" concept would be equivalent to the three mile territorial limit beyond which the high seas became common property. The three mile limit, which is based upon the distance that a cannon could propel a cannonball,[228] became technologically outmoded

224. CBS Evening News, Jan. 19, 1983.

225. *But see* The Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794, T.I.A.S. No. 4780, 402 U.N.T.S. 71 (signatory nations agree to cooperate in scientific endeavors in Antarctica and not to enlarge any existing claims to sovereignty or assert any new claims to sovereignty on the continent).

226. *Compare* Convention on International Civil Aviation, Dec. 7, 1944, art. 1, 61 Stat. 1180, T.I.A.S. No. 1591 ("The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory.") *with* Treaty on Outer Space, Jan. 27, 1967, United States-United Kingdom-U.S.S.R., art. 2, 18 U.S.T. 2410, 2413, T.I.A.S. 6347 ("Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.").

227. *See, e.g.*, Glazer, *supra* note 40, at 291-93.

228. Baty, *Three Mile Limit*, 22 AM. J. INT'L L. 503, 505 (1928).

with the development of aircraft. Obviously, the concepts applicable to define shared and owned air space are as varied as the imagination of legal scholars.[229]

Included in the Final Acts of the 1979 WARC was a resolution guaranteeing "in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to space services."[230] This admirable goal raises questions about the legal definition of "equitable access." Even assuming that the countries could reach an agreement on a definition for "equitable access," it is not clear how such access could be guaranteed. The WARC resolution considerably exceeds the admonition to member nations of Article 33 that radio frequencies and orbital parking places are limited natural resources which should be "used efficiently and economically so that all countries . . . may have equitable access."[231]

"Equitable access" is more nearly defined as fair access rather than exact equality of access, although another WARC 79 resolution admonishes the ITU administration to consider that "all countries have equal rights" to space.[232] Thus it is not clear whether access to space for communication purposes should be determined on the basis of a common ownership of space, of a fair allocation of communication services that considers need and technical ability, or of some absolute property right in a portion of space.

None of these concepts of territoriality helps very much to establish rights in information that is in transit through the radio magnetic spectrum to and from a geostationary satellite 22,300 miles out in space.[233] In addition, the present jurisdictional scheme perhaps underestimates the functional changes that have accompanied the growth of large economic enterprises which operate transnationally. Most of the jurisdictional aspects of territoriality oper-

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229. *See* M. McDOUGAL, H. LASSWELL & I. VLASIC, LAW AND PUBLIC ORDER IN SPACE 193-359 (1963).

230. Resolution B.P. Final Acts of WARC 1979.

231. 1973 Plenipotentiary responding to WARC 1971 Resolution Sp. 2-1.

232. *See* Memorandum of Martin A. Rothblatt to members of Working Group B, Space Advisory Committee to the FCC (Mar. 17, 1982).

233. An accepted principle of international law does exist, however, stating that sovereign states have a right to object to transgression of their territory by offensive radio waves through protest or jamming. Estep & Kearse, *Space Communications and the Law: Adequate International Control After 1963?* 60 MICH. L. REV. 873, 876 (1963). Nations "may interdict, by right, the passage of radiowaves through their territorial airspaces." Glazer, *supra* note 40, at 292.

ate under national systems of justice. Interestingly, a law of merchants existed in the Middle Ages, which transcended territorial boundaries and preceded the historical development of the nation state as a powerful political entity. An examination of the manner in which the *lex mercatoria* of the medieval merchants functioned may be useful to determine its potential applicability to today's growing global networks.[234] In a world in which the annual income of some transnational companies exceeds the gross national product of many nations, parallel systems of governance may provide guidance in the development of an open telecommunications system in which messages can flow freely from enterprise to enterprise, institution to institution, and person to person. A Japanese legal scholar suggests: "In the administration-oriented economic law field, we must also realize that the adherence to ego-influenced exercises of sovereignty will only further confusion and confrontation in a world of interdependence."[235]

XI. PERSPECTIVES

The legal issues that this Article addresses are only a few of the many questions concerning transborder data flow that are emerging in various national, regional, intergovernmental, and international fora. For example, some legal theorists propose to tax the flow of information by measuring the bit stream or the value of the information that it contains.[236] This plan is probably no more ridiculous than taxing telephone calls, metering telephone rates, or valuing business telephone services more highly than residential, but the proposal clearly is threatening to free trade practices and inimical to first amendment values. Other theorists argue for absolutely unfettered flow of information, whether by newsprint or by electrons.[237] This view fails to consider the many ways in which all nation states alter the flow of information to suit their political, military, and economic strategies.[238]

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234. Sono, *Sovereignty, This Strange Thing: Its Impact on Global Economic Order*, 9 GA. J. INT'L & COMP. L. 549, 557 (1979). For a scholarly discussion of the *Lex Mercatoria*, see F. SANBORN, ORIGINS OF THE EARLY ENGLISH MARITIME AND COMMERCIAL LAW (1930); Teetor, *England's Earliest Treatise on the Law Merchant*, 6 AM. J. LEGAL HIST. 178 (1962).

235. Sono, *supra* note 234, at 557.

236. *See, e.g.*, Madec, Economic and Legal Aspects of Transborder Data Flows, OECD Doc. EST I/ICCP 80.26 (1980), *cited in* Eger, *The Global Phenomenon of Teleinformatics: An Introduction*, 14 CORNELL INT'L L.J. 209 & n.26 (1981).

237. I. POOL, TECHNOLOGIES OF FREEDOM (forthcoming 1983).

238. *See* Hagelin, *Prior Consent or the Free Flow of Information over International Satellite Radio and Television: A Comparison and Critique of U.S. Domestic and Interna-*

Determining the appropriate legal restrictions and freedoms for transborder data flow is a difficult task. Critics at either end of the spectrum fail to reach satisfactory conclusions on this issue. Proponents of a highly regulatory regime[239] doubtless are premature, because even if the components of a regulatory scheme were obvious, governments would not know where or how to establish it. On the other hand, uncompromising advocates of "free flow" are out of touch with reality.[240] Most of the world simply will not accept this practice.[241] The United States has no sanction with which to force other countries to apply a facsimile of the first amendment. Moreover, other nations consider the notion of freedom of speech to be a peculiarly American policy that most benefits American information products and services.[242]

Consequently, legal skirmishes in a multiplicity of legal arenas are inevitable, and all interested parties must attempt to work out the rules under which the implications of information societies in an interdependent global economy will function. Whatever the results, unfettered competition among private corporate entities clearly will not produce an international free marketplace in information. The competitors in this marketplace by no means are all private, and the interests at issue span public, private, and governmental sectors. To achieve a workable system nations of the world must combine hybrid policies when expediency dictates, cooperate when cooperation is mandatory, and compete when the virtues of competition are apparent, as in the stimulation of innovation.

The complexities of transborder data flow negotiations, litigations, and arbitrations—as well as the exhortations to conscience and equity—are almost incomprehensible. The positions that each

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tional Broadcast Policy, 8 SYRACUSE J. INT'L L. & COM. 265 (1981); Levin, *Foreign and Domestic U.S. Policies*, TELECOM. POL'Y, June 1982, at 123; Levin, *Orbit and Spectrum Resource Strategies: Third World Demands*, TELECOM. POL'Y, June 1981, at 102.

239. *See, e.g.*, Bing Report, *supra* note 24; R. Groshan, *Transnational Data Flows: Is the Idea of an International Legal Regime Relevant in Establishing Multilateral Controls and Legal Norms?*, 15 L. TECH. 1 (1982); Hondius, *The Legal Regulation of Information and Data Processing*, 2 ISSUES IN COM. 29 (1978).

240. *See* I. POOL, *supra* note 144; Susman, *The Western World and Third World's Challenge* in CRISIS IN INTERNATIONAL NEWS: POLICIES AND PROSPECTS 344-55 (J. Richstad & M. Anderson eds. 1981); Theberge, *UNESCO's New World Information Order: Colliding with First Amendment Values*, 67 A.B.A. J. 714, 716 (1981).

241. *See* An Alliance for World Communications and Information (June 15-16, 1978) (minutes of London meeting, Brussels Mandate).

242. *See* H. SCHILLER, COMMUNICATION AND CULTURAL DOMINATION 39-40 (1976); A. SMITH, THE GEOPOLITICS OF INFORMATION, HOW WESTERN CULTURE DOMINATES THE WORLD (1980).

party takes in disputes or negotiations will depend upon the particular perspective of the proponent. Available, reliable, accurate, and low cost access to a variety of options in information services may be of high priority to an individual. A multinational bank, in contrast, will require high speed, secure, private line service to specified locations and access to the public network for the delivery of financial information services to its customers. An ethnic or religious group may want direct access to its members without interference by governmental entities. A government, however, will put a higher priority on gateway nodes, which provide a high level of access control; deposit of data bases in its own country's files; use of locally produced hardware and software; and the availability of encryption keys to protect its national security interests and encourage development of its own information economy.[243] Government also may desire to control the content of traffic through its territorial boundaries by reviewing applications and licensing only the interests that coincide with its national priorities.

Proponents of a global perspective might argue for sharing spectrum resources and expediting and giving high priority to social service systems that are available to all countries. Thus, people who look upon themselves as "citizens of the world" favor information systems that provide environmental monitoring, weather predictions to help prevent disruptions and loss from hurricanes and typhoons, and that protect against terrorism, encourage law enforcement, expedite land use planning, and facilitate pestilence control. A global system of information management would put high priority on ISDNs,[244] which would guarantee to businesses, institutions, and individuals anywhere on the network the world's collective knowledge at their fingertips. This integrated network ideal is like the "Networks for Knowledge" program that President Lyndon Johnson espoused shortly before he announced his intention not to seek another term of office in 1968.[245]

An acquaintance with the varied objectives of competing interest groups makes it easy to understand the policies that the different nations espouse currently in the global dialogue about the New

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243. Encryption is the encoding of a signal so that interceptors are unable to understand the transmission without the "key" that deciphers the code. For further discussion of the science of cryptology, see *supra* note 117.

244. *See supra* note 31 and accompanying text.

245. *See* Gardner, *Selling America in the Marketplace of Ideas*, NEW YORK TIMES MAG., Mar. 20, 1983, at 44, 63.

World Information Order (NWIO).[246] Those countries, notably Sweden,[247] with the greatest concern about their societies' vulnerability to data stored outside their national boundaries are pursuing national policies to ensure information independence. Countries like Japan that perceive the opportunities of a large information marketplace are following strategies to give themselves the economic capability to create their own hardware and software for marketing to the rest of the world and, consequently, to strengthen their own economies.[248] Countries that are vigorously pursuing national telematics policies include France[249] and Brazil.[250] Nations that perceive themselves to be too small to develop the computer capability within the confines of their own national boundaries are working to combine their economies to compete more effectively. The harmonization policies that the European Economic Community has espoused are an example of this type of joint action.[251]

Canada is a leader in concern about cultural sovereignty. Living in close proximity to the United States, Canadians have developed a deep awareness about the loss of cultural identity and control over their own information resources. Canada has developed transborder data flow policies in a number of fields including the print media, motion pictures, direct broadcasting satellites, and computers, and it has served as a model for many countries seeking national telematics policies.[252]

Other organizations and their nation state members advocate

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246. "The 'new world information order' has been heralded by the United Nations Educational, Scientific, and Cultural Organization [(UNESCO)] as an attempt to facilitate the free flow of information and condemned by western journalists as a step toward legitimizing government control and censorship of the press." Theberge, *supra* note 240, at 714; *see International Satellite Communications and the New Information Order*, 8 SYRACUSE J. INT'L L. & COM. 321 (1981). The NWIO idea has emerged gradually through UNESCO conferences; it is a policy that promotes development of national communications infrastructures, as opposed to private sector control of communications. Theberge, *supra* note 240, at 716.

247. *See* COMMISSION ON NEW INFORMATION TECHNOLOGY, NEW VIEWS: COMPUTERS AND NEW MEDIA—ANXIETY AND HOPES (1979); Freese, *The Vulnerability of Computerized Society*, TRANSNAT'L DATA REP., vol. 4, no. 5, at 21 (1981).

248. *See* Y. MASUDA, *supra* note 14, at 3-23; RESEARCH INSTITUTE OF TELECOMMUNICATIONS AND ECONOMICS, A VISION OF TELECOMMUNICATIONS IN THE '80S (R. Varner trans. 1982).

249. S. NORA & A. MINC, THE COMPUTERIZATION OF SOCIETY (1978).

250. Brizida, *supra* note 11, at 19.

251. *See* Ramsey, *supra* note 167, at 248-52; *supra* note 169 and accompanying text.

252. *See* CONSULTATIVE COMMITTEE ON THE IMPLICATIONS OF TELECOMMUNICATIONS FOR CANADIAN SOCIETY, CLYNE REPORT (1979); Ganley, *Political Aspects of Communications and Information Resources in Canada*, 1 INFORMATION SOC'Y (1981); Ostry, *Telecommunications in Canada: Today, Tomorrow and Next Week?*, 4 INTERMEDIA 6 (July 1979).

liberal information trade policies. The thirty-seven member nations in the Intergovernmental Bureau of Informatics (IBI) are active in formulating policies of reciprocity, in which more information will flow between developed and developing nations.[253] Major ferment has occurred within UNESCO over issues such as "balanced information flow," the licensing of journalistic endeavors, and the transfer of information technology to the developing nations.[254] International businesses within the International Chamber of Commerce are pursuing a policy of liberalization; they are favoring international trade in information products and services and urging the availability of private leased lines for the development of special purpose data networks.[255]

Only a policy in favor of greater international cooperation in the development of global information resources seems to lack advocates.[256] Like the United States, where the proliferation of special interest lobbying groups makes it difficult to identify the collective public interest, in the international arena a locus of responsibility is difficult to find for ascertaining global interests that may override rather than coincide with legitimate national concerns. While a surplus of lawyers is available to represent corporate, nonprofit, and governmental clients, few lawyers represent the global common interest.

Daniel Bell, who has labored long and hard to understand the social problems created by the new information technologies, has stated:

> We must try to think in terms of how one can bring all these matters together in some intellectual coherence, in some intellectual framework, that allows one to think of society not in terms of gadgets, because it is not gadgets which will change society, but modes of thought.
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> . . . .
>
> . . . Today we have an international economy, but the political units are national political units; and the relationships are unstable. We have centrifugal and centripetal forces. We have an international economy, but

253. *See* Declaration of Mexico on Informatics, Development, and Peace (June 23, 1981); *Issues on Transborder Data Flow Policies*, *supra* note 22.

254. S. MACBRIDE, *supra* note 51 (containing a detailed exploration of these issues by UNESCO's International Commission for the Study of Communication Problems).

255. Commission on Computing, Telecommunications and Information Policies, Working Party, Telecommunications; The Liberalization of Telecommunications Services—Needs and Limits (March 1982).

256. The major exception is the very substantial investment in both time and money that nations have made in the development of the INTELSAT global information transport system. The World Communications Year, which the International Telecommunications Union initiated, also may be a major thrust in the direction of fomenting interest in global perspectives.

> also a new international division of labour which is re-making and re-working the entire world economy.
>
> . . . .
>
> . . . *[T]hen the national state has become too big for the small problems of life and too small for the big problems of life.*[257]

Ample opportunities will arise in the days and years to come for lawyers and public policy analysts to propose some coherent global alternatives for rationalizing the legal environment in which electronic transfer of information across national boundaries occurs. The proliferation of networking across such boundaries will not abate. A number of alternatives are available to lawyers:

(1) They may follow the developments in such diverse arenas as the IBI, UNESCO, CoE, OECD, and the ITU and either react to adverse circumstances affecting their clients or take a leadership role in expounding policies that favor their clients.

(2) They may respond only in particular circumstances in which their clients face litigation and thereby contribute in an ad hoc manner to the developing body of law of international networks.

(3) They may anticipate the legal problems that their clients and their nation may face and devise working hypotheses concerning such diverse legal questions as tort liability, conflicts of law, criminal liability, and property rights.

(4) They may develop national legislative strategies or national teleinformatics policies to improve their own country's position in the global competitive environment.

(5) They may develop strategies for a global system of information transport and global sharing of information resources.

Transborder data flow rapidly is becoming an integral part of the infrastructure that links societies globally. That this data flow will continue to increase in importance is certain. Less clear, however, is how the United States[258] and other nation states will respond to the changes that transborder data flow and the global links it inevitably provides will bring. This Article concludes with a list of twenty principles that may serve as guides for development.[259] These principles rest on the ideal that an information

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257. D. Bell, The Matching of Scales 13, 19, 21 (1979) (Louis G. Cowan Lecture of the International Institute of Communications) (emphasis in original).

258. *See supra* notes 2-13 and accompanying text.

259. Although the author has developed these principles independently, a surprising similarity exists hetween those enunciated in this Article and the principles that J.C.R. Licklider and Albert Vezza have espoused. Licklider & Vezza, *Applications of Information Networks*, 66 PROCEEDINGS OF THE IEEE 1330 (Nov. 1978). These authors describe 19 char-

transport system which optimizes the opportunities for personal and national interaction will serve best the world community of nations. They are as follows:

(1) *Availability:* This concept concerns the physical existence of telecommunications systems to serve global needs. Availability not only implies the existence of telecommunications facilities, but also actual channel space and operational readiness to receive and transmit messages whenever and wherever users desire.

(2) *Accessibility*: According to the Japanese this concept is even more inclusive than availability—it implies guaranteed use to those who would like to claim the right.

(3) *Authenticity*: This principle concerns the ability to rely upon messages stored, transmitted, or processed through electronic systems to establish legal rights and obligations.

(4) *Compatability*: This principle assumes that technical systems can be interfaced.

(5) *Diversity*: This principle assures users access to a choice of telecommunications services and information systems.

(6) *Efficiency*: An economic goal espoused in most national policies, this principle means that the telecommunications system should be cost effective for its intended purposes.

(7) *Equity*: Users should share both rights and responsibilities.

(8) *Insurability*: This concept concerns the ability to assess risks and obtain insurance against unforeseen and uncontrollable events and circumstances that disrupt service or impose loss upon users.

(9) *Integrity*: This goal is message clarity and accuracy, which permits the assurance that users will receive their messages without error.

(10) *Interactivity*: This principle is the potential for immediate response in real time.

(11) *Interoperability*: This concept implies more than mere "plug compatability." Interoperability concerns protocols for access to, through, and across various public and private networks, so

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acteristics that they helieve computer networks frequently require: bi-directionality; freedom from error; efficiency despite "burstiness"; low cost per bit of information; high connectivity; high information rate; security; privacy; authentication; high reliability; capability of sending to and receiving from another station at once (full-duplex transmission); priority service; speech capability; pictures; insensitivity to distance; short transit time delay; uniform time delay; broadcast capability; mobility. *Id.* at 1337. *Cf.* Branscomh, *Principles for Global Telecommunications Systems*, in WORLD COMMUNICATIONS: A HANDBOOK (forthcoming 1983); *infra* text accompanying notes 259-62.

that no one arbitrarily can exclude users from the global system.

(12) *Literacy*: Telecommunications systems should be "user friendly" and not inhibit use by nonprofessionals.

(13) *Property*: This principle addresses guaranteed protection of recognized exclusivity rights in personal information. These rights include the right to privacy and the right to release or withhold information concerning oneself, corporate rights to protect information transport that either is necessary to internal operations or is a commodity in trade, the right to reward for intellectual productivity, and the right to cultural sovereignty.

(14) *Reciprocity*: All users should have the same access to telecommunications services and products as most favored nations.

(15) *Redundancy*: Under this principle if one information transport system breaks down, an alternative channel is available.

(16) *Reliability*: Regularly established and uninterrupted service should be available.

(17) *Security*: This principle concerns the protection of data from disclosure or misuse and the assurance that the intended recipient and no one else receives messages.

(18) *Transparency*: The user should not confront apparent inconsistencies in operating systems or equipment.

(19) *Universality*: This is the ultimate goal of integrated services digital networks (ISDNs) and the final extrapolation of availability, interoperability, and transparency.[260]

(20) *Vulnerability*: Users should have assurance that interdependence is mutual and dependencies are reliable. They should be reasonably certain that access is available to information stored in remote data bases in times of crisis or national or personal peril.

In conclusion, the time is ripe for a new level of statesmanship in the governance of global networks. Society needs less naysaying about the potential for abuse of global networks and a more diligent effort to achieve their positive benefits for the global family of nations.

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260. *See supra* note 31.