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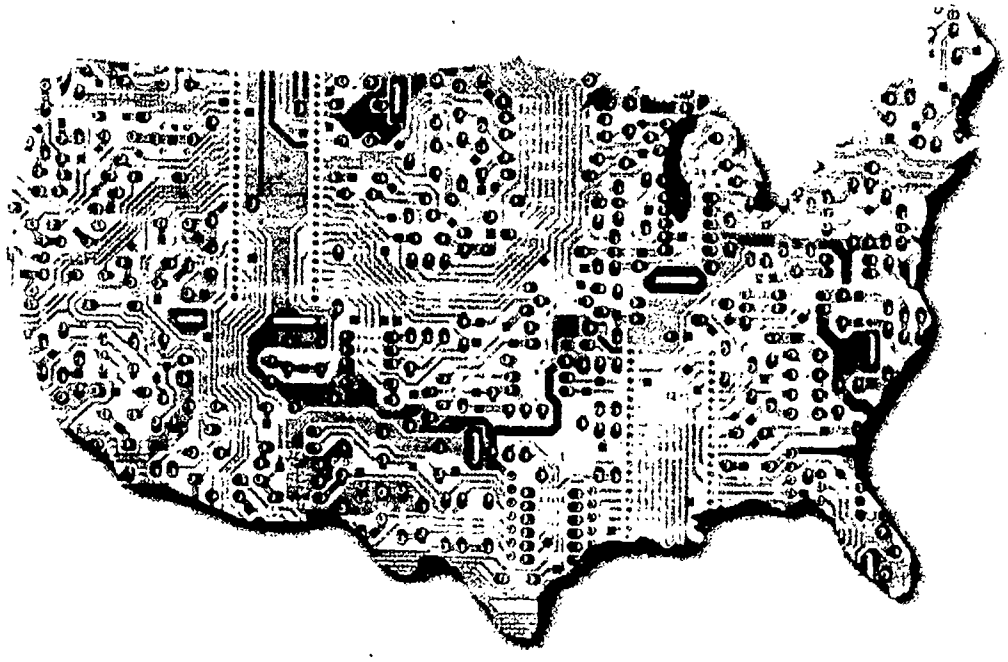
ABSTRACT

After the publication of the Clinton Administration's "The National Information Infrastructure: Agenda for Action," a group of telecommunication specialists were asked to evaluate the proposals in order to broaden the policy discussion concerning the National Information Infrastructure (NII). This collection contains their visions of the nation's future information infrastructure development and their views on how the administration can best achieve its goals. The following papers are included in this volume: "Balancing the Commercial and Public-Interest Visions of the NII" (Lewis M. Branscomb); "Information Infrastructure and Economic Vitality" (Craig I. Fields); "Sustainable Democracy" (Charles M. Firestone and Katharina Kopp); "Open Sesame! How to Get to the Treasure of Electronic Information" (Francis Dummer Fisher); "Competition in Local Telecommunications (Henry Geller); "Extending Universal Service through the NII" (Susan G. Hadden, for the Alliance for Public Technology); "The National Information Infrastructure Report: A Welcome Call to Action" (Allen S. Hammond, IV); "Assembling the Pieces" (Peter W. Huber); "Toward a National Telecommunications and Information Policy: A Development-Based Vision" (Heather E. Hudson); "The Promise of the NII: Universal Service is the Key" (Mary Gardiner Jones); "Networks, Standards, and Intellectual Property: The Fabric of Information Infrastructure" (Brian Kahin); "Building Open Platforms: Public Policy for the Information Age" (Mitchell Kapor); "Public Libraries, the Public Interest, and the National Information Infrastructure (NII): Expanding the Policy Agenda" (Charles R. McClure); "Philanthropy and the Agenda for Action" (Karen Menichelli and Andrew Blau); and "Create a Corporation for Public Network Applications: Beyond the Information Superhighway" (Eli M. Noam). (JLB)

20/20 VISION

THE DEVELOPMENT OF A NATIONAL INFORMATION INFRASTRUCTURE



U.S. DEPARTMENT OF COMMERCE
National Telecommunications
and Information Administration

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

MESSAGE FROM THE SECRETARY

The Clinton Administration released the National Information Infrastructure: Agenda for Action on September 15, 1993, outlining general goals and principles for a National Information Infrastructure (NII). Since the release of the Agenda, President Clinton and Vice President Gore have emphasized the need for developing the NII as an "information superhighway" for all Americans. To implement that goal at the federal level, the Administration has formed the Information Infrastructure Task Force (IITF), which I chair.

The IITF's Telecommunications Policy Committee (TPC), which is responsible for formulating a consistent Administration position on key telecommunication issues, is working to update and revise governmental policies in order to make real the vision of an information superhighway. In doing so, consumers, business, labor, and academia should have every opportunity to expand policy debate and generate ideas for the successful development of the NII. Larry Irving, chair of the TPC and Administrator of the National Telecommunications and Information Administration, is working to help advance that dialogue.

Shortly after the publication of the Agenda, Assistant Secretary Irving asked a group of distinguished experts to evaluate the Administration's proposals in order to broaden the policy discussion concerning the NII. In particular, these experts were asked to articulate their personal visions of the nation's future information infrastructure development and their views on how the Administration can best achieve its goals. This collection, which is called 20/20 Vision, captures those visions.

20/20 Vision includes the reflections of fifteen telecommunications thinkers who, among other things, address policy challenges confronting the Administration, suggest new ways to regulate the communications sector, stress the importance of the production of information of social value, and emphasize the utility of public-private partnerships that reduce risks to business. Other ideas include developing benchmarks to measure the success of the NII, and ways to extend the concept of universal service and ensure information access for all Americans.

20/20 Vision is an example of how those outside of government can help lead in developing a NII that interconnects all Americans in ways that enhance our economic prosperity, promote diversity, strengthen democracy, and improve access to the best in education and social and health services for everyone. 20/20 Vision is only the first of such public forums and projects that will contribute to shaping the NII.

Ronald H. Brown
Secretary of Commerce

NTIA Special Publication 94-28

20/20 VISION

The Development of a National Information Infrastructure

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary
Larry Irving, Assistant Secretary
for Communications and Information,
and Administrator, National Telecommunications
and Information Administration

March 1994

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Editor

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Cover Design

Petra Karadimas

Document Design, Layout, and Typesetting

Arthur J. Altenburg

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The views set forth herein are attributable solely to the individuals espousing them. They should not be regarded as reflecting the views of the United States Government.

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Balancing the Commercial and Public-Interest Visions of the NII

Lewis M. Branscomb[1]

INTRODUCTION

The promise of an information-rich society, supported by a digital electronic infrastructure, is both very compelling and disappointingly elusive. With every information technology innovation, visionaries have identified the potential for using information services to reform public education, enhance participation in democratic processes, make government more accountable, and improve the quality of working life. Many people have worked very hard to bring to reality this dream of citizen access to both public and private information sources and efficient public services delivered over a network. At the same time the business sector, pressed by foreign competitors, has been restructuring firms internally and the way firms relate to each other. Vertical integration is giving way to corporate alliances; end-product manufacturers are relying more on fewer suppliers with whom they exchange technological information. Economists refer to this new industrial paradigm as "industrial networks."[2] Throughout the manufacturing and service

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1 LEWIS M. BRANSCOMB is Director of the Program on Science, Technology, and Public Policy of Harvard University's Center for Science and International Affairs. He is principal investigator of the Program's Project on Information Infrastructure. He is also the editor of *Empowering Technology: Implementing a U.S. Policy* (Cambridge, MA: MIT Press 1993).

2 *See* Christopher Freeman, *Networks of Innovators: A Synthesis of Research Issues,* paper presented to the International Workshop on Networks of Innovators, Montreal Canada, 1990. Quoted in Michael Hobday, *Dyanamic Networks, Technology Diffusion and Complementary Assets*, October 1990, draft paper from the Science Policy Unit, Sussex University UK.

industries, computer networks are being used to reduce transaction costs and support Total Quality Management.

The Internet, the largest collection of interconnected networks in the world, grew out of the needs of the research and education community for inexpensive communications and facilities for distance-independent collaboration. Internet has created a community of millions of computer-literate professionals in over 100 countries. Anthony Rutkowski estimates that at least 10 million people have access to the Internet world wide, and the traffic level has been growing at over 10 percent per month for a number of years. In the U.S. some 28 million personal computers, or 56% of all PCs installed in the US, will be attached to others through local area networks (LANs) by the end of 1995.[3]

Much of the technology to realize these public and private visions is in hand.[4] There are experiments and limited services in fulfillment of the dream available not only on the Internet, but on emerging commercial services sharing the same facilities. The Internet, however, remains primarily the province of computer-literate people who are able to tolerate its unfriendly interfaces and whose institutional connections give them low-cost access to Internet's resources. What is now required to realize the vision—both of the new applications and the new communications and computer services?

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3 Forrester Research's Network Strategy Report: *LANs for Free?* Nov. 1991.

4 One exception is high performance computing, which has shown the most rapid progress of all the technologies in the NII, and is still in the early stages of an extraordinary revolution. All of the most advanced applications of the new multimedia world (virtual reality, interactive graphics, animation) stem from scientific developments based on high performance computing. The "Agenda for Action" contains a commitment to completing the HPCC plan; the most critical part of this plan is the public investment in High Performance Computing, still more promise than reality but an enormous opportunity for the U.S. economy and the platform for much of the brave new world of NII advanced applications. See National Science Board, *From Desktop to Teraflop: Exploiting the U.S. Lead in High Performance Computing*, Report to the National Science Board, October 1993, by a Blue Ribbon Panel on High Performance Computing chaired by Lewis M. Branscomb.

TWO POLICY CHALLENGES

Two challenges face the Administration. The first is to bring three diverse service environments together into an information infrastructure that integrates three different worlds:[5]

(a) *Knowledge Infrastructure,* symbolized by Internet, knitting together the research, education, and professional communities dedicated to generating and sharing knowledge;

(b) *Integration Infrastructure,* today reliant on Internet but expected to evolve to more expensive, reliable, and secure commercial computer networks, tying the economy together through inter-firm alliances and business transactions;

(c) *Telecommunications Infrastructure,* driven by the technological revolution in broad-band, digital communications capable of delivering new multi-media services that open up enormous markets for public entertainment, as well as of more conventional communications services.

The issues here are: How can the openness, flexibility, interconnectivity, and low user cost seen by users of the Internet be preserved in networks that also serve the faster response times and higher reliability requirements of commercial information service? Will the entertainment-driven broad-band capabilities emerging in the market also be able to support the needs of supercomputer applications in science and engineering? If the usage pricing common to many commercial services displaces the access pricing of the knowledge networks, will the values that have driven the growth of Internet be lost to professional communities? How can the government leverage private investment and commercial markets in building information infrastructure and still achieve the goal of universal access to public services?

The second policy challenge is to provide the incentives that will stimulate the creation of the services, public and private, that are so promising for the nation's future. How will these new services be

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5 Brian Kahin, "Information Technology and Information Infrastructure" in Lewis M. Branscomb, ed., *Empowering Technology: Implementing a U.S. Policy* (Cambridge MA: MIT Press 1993) 139.

financed? What combination of public and private investments will be required? What incentives, standards, and regulations will best promote the establishment of the envisioned capabilities? Are policies needed to prevent the home-shopping and movie channels from suppressing or displacing these services (through inappropriate architecture or pricing policies) and merely expanding the scope of Newton Minow's "vast wasteland" of television?

DRIVING FORCES FOR THE NII

The National Information Infrastructure (NII) that is emerging is being shaped by two largely independent lines of market development. On the one side there is the extraordinary growth of usage of digital networks such as the Internet, with exciting, innovative information distribution and retrieval services, many in support of the public interest. Many of them are stimulated by federal government science and technology agencies and focus on electronic access to public information sources and on service to the research, education, library, and health service communities. These are the services the National Telecommunications and Information Administration is exploring and promoting.

Internet also links industrial research and development laboratories to universities, government laboratories, and the independent sector. These links are very important to accelerated commercialization of U.S. research, and thus enhance competitiveness in our economy. Registration of commercial networks (much of it selling access to valuable information databases) now outpaces non-profit traffic on the Internet.

The second development in the national information infrastructure arises from a totally different series of events—the emergence of new broad-band and interactive services into the home. New means for home access to video-on-demand—direct broadcast satellite, interactive cable TV, compressed video on telephone cable, CD ROM diskettes—seem likely to expand dramatically access to home-shopping and TV movies. Billions of dollars of capital are being invested in the new business combinations to exploit this consumer information market; the dollars completely swamp the modest investments being made in bringing public services to citizens and public institutions.

This revolution in telecommunications regulatory policy stems from the Modified Final Judgment in the AT&T antitrust case. There are new technological possibilities for disseminating video over the twisted pair lines that bring phone service into the home, the possibility of interactive service on cable TV channels, including voice service, and emerging digital wireless services providing bypass into the home as well as mobile service. These new capabilities can evolve in either of two directions. They can provide the broad-band access to the "last mile"—the connection to the home—thus extending the Internet vision to broad-band access to anyone with a TV set. Or they can see the vision of a better informed, more efficient and democratic society overtaken by saturation of viewer attention by access to home shopping and a choice among 10,000 movies.

BALANCING COMMERCIAL MARKETS AND PUBLIC INTEREST APPLICATIONS IN THE NII

Will these new entertainment and shopping channels push aside public services of great value to society? It seems likely that the enormous consumer markets for electronic entertainment and for voice communication will dominate the modest resources invested in the many networks that make up the Internet and the bulletin boards and other innovative information services accessible through the Internet.

Thus the first responsibility of the Information Infrastructure Task Force is to assign responsibilities and formulate legislation to set policies, regulations and standards that ensure that the vision of a wired, information-rich nation is not obscured by the much larger emerging electronic entertainment markets.

When television first appeared in the 1930s it was widely believed that its primary application would be to enrich public education. Educational broadcasting services were established, most of them at universities, to realize this dream. By the 1950s this dream was largely lost, overtaken by the sitcoms, games, and sports programs of commercial television. The educational channels were relegated to UHF channels, which few home owners could receive clearly, and little public

funding was invested in educational programming and related curriculum development for the schools.

The computer industry made big investments in computer-based educational technology in the 1960's, only to realize that the technology was too complex for the schools and there was no source of investment in educational software and teacher training. Those early efforts were abandoned, only to be revived in the 1980s; they are now beginning to deliver real benefits to schools. But they will still be a disappointment without huge investments in educational software, curriculum development and teacher training and assistance.

In the early days of cable television the Congress thought that by requiring local program origination, the power of television could be put to the service of small communities, providing citizens video access to local government and to one another, but only a few communities have been able to realize this potential. Many local public access channels have fallen into disuse. The arrival of 500 more TV channels will not alter this situation.

Thus the Promise of the NII in section I of *The National Information Infrastructure: Agenda for Action* is surely an admirable vision, one which realizes the potential demonstrated in the Internet and takes advantage of the broad-band capabilities being driven by entertainment. Unfortunately the nine principles of section III fall short of committing the Federal and State Governments and local communities to the realization of any of that vision save the sixth (access to your favorite movies and video games). The principles do specify essential elements of systems design: security, universal access, interconnectivity, universal service, protection of intellectual property, and technical innovation. They fail, however, to commit the federal government to leadership in ensuring that the architecture of the national telecommunications infrastructure, the policies for pricing of and access to both public and private services, and the generation of the public interest applications fulfill the Promise described.

A critical near-term issue is the preservation of the conditions that made Internet so successful. How will these values be preserved?

PRESERVING THE VALUE OF THE INTERNET CULTURE[6]

NSF was the leader within government, in a position to assert those values and protect them, but is constantly narrowing its focus and backing away from asserting this leadership as the political and economic stakes rise.[7] Internet is egalitarian for those who are on it; it is elitist for those who cannot use it or do not have access to it. Who will guide the broadening of access to Internet, while preserving its special character? Who is going to protect the public values in the information infrastructure? Who will protect the culture built in the Internet by the users who created it? How should the federal agencies advance the NII, and what provisions of policy should be incorporated?

(a) **Charging by access to communications capacity, rather than by end-user fees.** Charging by capacity makes network use feel like it is free. Admittedly, current practices do not encourage efficient use.[8] Charging by capacity keeps the price close to real cost, and minimizes administering a charge per use. The Regional Bell Operating Companies may prefer to apply the "telephony model" to networks.[9] Will they extend capacity pricing to digital computer networks? NETCOM and Delphi are two firms that are profitably offering Internet access for individuals on a flat rate basis.

(b) **Maintaining distance-independent pricing.** International access through cooperating networks in other countries is a huge

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6 The following discussion is adapted from a report by Lewis Branscomb and Ken Klingenstein on discussions at the Telluride (Colorado) Institute's Ideas Festival, July 25, 1993.

7 NSF should be complimented, however, for funding some applications work of social significance—including rural "datafication" experiments.

8 A study reported by Professor Kenneth Klingenstein found that 70% of file transfers at the University of Colorado are uncompressed, for lack of any direct incentive to minimize bandwidth use. Reported by Prof. Klingenstein, Telluride Institute Ideas Festival, July 25, 1993.

9 It should be noted that the telephone companies do not employ usage-pricing in the local calling area, where most of the traffic is. These local calling areas are growing geographically in many parts of the country. Thus it is not quite fair to call the long distance pricing principles the "telephony model."

advantage for Americans seeking to compete and collaborate around the world. If international telephony rates were charged to end-users, this access would be severely restricted. But we must recognize that telephony prices are, in fact, only weakly distance-based in the U.S., given the high intra-LATA prices, and increasingly competitive long distance rates.

(c) **Network externalities: vital to both end-use value and to network economics.** The Internet needs to grow another two orders of magnitude before it is as economic as it could and should be. If the Internet becomes completely commercialized, will usage saturate at a level below that best capable of serving all society needs?

(d) **Preserving the very low cost of information sharing.** Actual cost of information sharing, as demonstrated in non-profit bulletin boards and "gopher" services, for example, can be exceedingly low, and does not require a market incentive, according to Paul Ginsparg, who set up an electronic physics journal at Los Alamos National Laboratory. He does not charge for access, which runs thousands of queries per hour. We must distinguish between the price of information and the price of access.

(e) **The collective value attribute of Internet.** Internet is not used primarily for point to point communication: the sharing of information is a key value. This sharing (of queries, answers to queries, and shared information) lies intermediate between point-to-point communications and broadcast. There is a form of knowledge externality in knowledge sharing. There is a selflessness in the way people in the "Internet Culture" voluntarily collect and share information.

(f) **International security value of international communication.** Many studies of the collapse of Communism and the disintegration of the Soviet Union point to the role of information technology as a democratizing (some might say revolutionary) force. Maintaining grass-roots communications to Americans around the world not only helps international collaboration among scholars, and the internal communications of multinational firms, but can make this a safer world.

(g) **Preserving an environment for innovative new uses of networking**. The key to the success of Internet is that it was invented by its users. It is open to all manner of experiments, social as well as technical, and the technology is flexible enough to facilitate such experimentation. It is essential that as the NII develops, federal regulation must not deny new styles of networking and new kinds of applications. It is not clear that a commercial entertainment driven NII will be able to offer such a flexible environment for innovation.

(h) **A major value of the Internet culture, but possibly a transient value, is the absence of junk mail, advertisements, and oppressive commercialism.** If the policies for the development of NII are driven by commercial investment, how can this condition be sustained?

TWO ADDITIONS TO THE AGENDA FOR ACTION

The Clinton-Gore Administration came into office determined to understand the promise of information infrastructure, diagnose the barriers to its realization, and solicit the cooperation of Congress, states and communities, and the public realize this promise. This is still an attainable objective. However it will not be attained by leaving applications initiative to commercial firms and by leaving the architecture of the communications and computing services to the contention of carriers before the FCC. The "Agenda for Action" contains many of the action elements necessary to realize the promise of NII. However, it would be a serious error to underestimate the importance of building both the institutional capacity and the software to support the public interest applications.

I recommend that a tenth Principle should be added to the nine in the "Agenda for Action:"

(10) To bring about the promise of Knowledge Infrastructure, the federal government accepts responsibility for working with states and communities to develop and realize the many non-profit public service applications necessary for the realization of the

"promise of NII." Appropriate responsibilities will be assigned by Executive Order to the departments and agencies.

- *Department of Commerce's Technology Administration, through NTIA: coordination and demonstration; through NIST leadership of standards to facilitate Integration Infrastructure.*[10]
- *Department of Education, with the states and communities: integrated electronic education materials into curricula and services to teachers to help them use them successfully.*
- *Department of Health and Human Services: networking physicians, hospitals, clinics and insurance companies to reduce the cost and improve access to health care and ensure privacy and citizen control of their medical records.*
- *Responsibilities to be designated: information networks for the Nation's libraries; community network services for participatory democracy, and other applications.*

The issue that remains unresolved, in spite of much excellent work on the "Agenda for Action," is the definition of the policy process that must be put in place at a high level of government that can identify the regulatory framework that best satisfies the needs of all these areas of promise. Thus the policy process must embrace executive branch, congressional, and private sector participation, and must be capable of generating a consensus strategy that all can support. A major barrier to attainment of this most fundamental goal is the weakness of the NTIA as a leader of this consensus process, the complexity of relationships between the FCC and all three constituencies, and the enormous influence of emerging commercial markets for entertainment and shopping.

10 Commerce must continue the emphasis initiated in the Bush Administration on standards to facilitate the use of networking in restructuring of U.S. industry—creating virtual companies, agile manufacturing, alliances between producers and their suppliers. Key elements in this program are the industrially developed product definition standards (PDES-STEP) and their environment CALS (computer-based acquisition and logistics system).

Information Infrastructure and Economic Vitality

Craig I. Fields[1]

Our national transportation infrastructure is more than the Interstate Highway System. It is also our network of local roads up to and including the family driveway; maps and road signs; automobiles, buses and trucks; chains of roadside motels, gas stations and fast food outlets; driving regulations, the Highway Patrol, and high school Driver's Ed; unwritten conventions of drivers' courtesy and the common architecture of road intersections, like the cloverleaf; the American Automobile Association and the morning television's traffic report; shipping brokers; and much more, including our entire system of rail, air and water transportation.

Similarly, our national information infrastructure is much more than an ultra-high capacity fiber optics network, indispensable though that is for our Nation's future. It is also the current long distance and local telephone systems—already using some fiber optics, cellular radio, cable and terrestrial broadcast television, satellite communications, both wired and wireless local area networks, paging systems, private microwave systems and emerging personal communication networks; contents like data bases, software, and movies in on-line digital library servers; digital televisions, nomadic personal digital assistants, and even smart home appliances employing information infrastructure to manage energy; electronic mail, video teleconferencing, voicegrams and videograms; on-

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1 CRAIG I. FIELDS is Chairman and Chief Executive Officer for Microelectronics and Computer Technology Corporation (MCC). In this position, he has operating responsibility for all of MCC's research programs, planning, marketing and human resources. MCC's research emphasizes those technologies which will be essential to success in the emerging global networked infrastructure. Dr. Fields also directs several of MCC's internal initiatives, including the formulation of a new strategic vision for the decade ahead, and works with the Senate and the House of Representatives on R&D activities of interest to members of Congress.

line directories and "yellow pages," electronic catalogs and price lists, personalized advertising, consumer assessments and certification; brokerage systems for coupling buyers and sellers of goods and services, and facilitating price setting; remittance services, digital signatures and digital money; teachers, pundits and commentators, lecturers, gurus, training courses, books and periodicals for learning to use all of this; and, again, much more. Increasingly this information infrastructure is integrated, intelligent, multi-media and secure; sophisticated and demanding consumers, like today's company vice presidents who used computers in junior high school, won't accept systems that are unintegrated, unintelligent, mono-media or unsecured.

Viewed this broadly, we already have a national information infrastructure; it is the richest in the world, and it is improving every day. That improvement comes mostly from private sector entrepreneurship and investment propelled by perceptions of markets and consumers. The Federal Government makes critical enabling contributions of science and technology; works with the private sector for the establishment of standards; and, as steward of the public interest, oversees a legislative and regulatory regime to reconcile public good and private interests. Such issues include the concept of universal service; management of limited common resources, like frequency spectrum; privacy and control of personal information; and protection of intellectual property.

It is in the nation's common interest to accelerate the ongoing enrichment of the national information infrastructure. The consequences will be better education and training, more effective health care, greater economic strength and competitiveness, and a generally improved quality of life ranging from more enjoyable entertainment to new ways of doing the family shopping.

The Federal Government can contribute to that acceleration in many ways. Some uses of the national information infrastructure are retarded by limitations in technology, in particular many important scientific research challenges which must be tackled if we are to advance in disciplines ranging from materials to meteorology. In those instances, increased and focused R&D support for the underlying technologies of high performance computing and communications are the highest priority.

Other uses of the national information infrastructure are retarded by our tangled regulatory structure and the collision of legitimate interests of private sector groups. The main consequence is a decreased real rate of investment in personal information services—private sector services like entertainment, shopping and new kinds of communication; as well as public sector services in education and health care, delivered to the home.

Untying the Gordian knot of regulations and sectoral interests retarding advances in entertainment is in the direct interest of the Federal Government in accomplishing its missions in areas like public health and education. The delivery of public sector services to every citizen and home won't be affordable to the taxpayer unless there is significant private sector investment in a foundation of high capacity telecommunications. That private sector investment is unlikely to be made unless it is justified on a firm business basis. The most compelling business case for such investment is in the expectation of consumer demand for new approaches to entertainment, shopping and personal communication.

One of the most important uses of our national information infrastructure—increased economic strength, competitiveness, and fuller employment—is limited by neither fundamental technology nor regulation, but rather by the residual risk to industry of employing information infrastructure for business success. It is in this area that appropriate Federal policies could have dramatic effects in the near term.

To appreciate the importance of national information infrastructure for business success we need to appreciate the changing fabric of business around the world. We are undergoing a fundamental change that can truly be called an industrial revolution.

Competition and differentiation is based less on unique product features and more on time to market for the next generation of product, value derived from quality and price of the product and accompanying customer service, and variety. By the latter I mean the ability to offer a sufficient variety of products that the consumer perceives a custom product at a mass production price. Instead of mass production and mass marketing of commodity products, a real or apparent production volume of one for a market size of one. Firms mastering mass customization win.

The business system is so "non-linear" that even small sustained advantages in time to market, price, quality or variety—in agility—can translate into large gains in market share.

The distinction between manufacturing and service is becoming blurred. Perhaps nine out of ten people employed at a manufacturing firm provide service, ranging from finance, personnel, purchasing, public relations, design, marketing, sales and general management to all-important customer service. Products are becoming packaged services.

Companies are outsourcing services that are not at their core: telecommunications, computer support, human resources functions, and even design, manufacturing and marketing. Companies are working more closely with their suppliers, and are developing relationships in the gray area between "make" and "buy," evidenced by joint design or collaboration on inventory control, as well as business success sharing arrangements involving profit and equity. Large firms are turning cost centers into profit centers, and spinning off divisions as separate companies. The brand name on the outside says little about the source of value added on the inside.

Joint design of products, joint management of inventory, joint scheduling of shipments, enhanced communication among leaders and managers, electronic funds transfer, general electronic data exchange, and automated marketplace brokerage for electronic commerce are the business of the national information infrastructure. Nicknames applied to various aspects of this industrial revolution include "virtual corporation," "enterprise integration," or "agile manufacturing."

In this context, information infrastructure impacts business success and economic strength in myriad ways.

- It facilitates cooperative work among companies, or even among groups within a company. It links suppliers and their customers.
- It reduces the penalty of location in rural areas or inner cities.
- It enables continuous process re-engineering, and even continuing re-invention, which is now required for business success: make yourself obsolete before your competitors make you obsolete.
- From a national perspective, it promotes investment. For decades to come there will be regional and national differences in the richness of information infrastructure, particularly because

information infrastructure involves human resources as well as technology resources. Nations with better information infrastructure are more attractive to investors, all other things being equal.

- The emerging global information infrastructure will bring new opportunities for the export of knowledge-based services in areas like health care, higher education or entertainment, where the U.S. is a world leader.

Despite these benefits, business application of information infrastructure is in its infancy. There are uncertainties in the definition of information infrastructure standards, interfaces, and interoperability specifications required for widespread and sustained connectivity. There are uncertainties about which are the most important and impactful applications of information infrastructure for business success. And there is the common chicken-egg problem in promulgating many new technologies, an uncertainty of scale: initially there are few business users and hence modest business utility; as long as there is modest business utility there are few business users.

Reducing these uncertainties will increase private sector investment in national information infrastructure aimed at business success. To reduce these uncertainties, the Federal Government can work as a partner with the private sector on test applications, demonstrations, experiments and pilot projects of business information infrastructure. The purpose of such public-private partnership is to share risk: standards risk, applications risk, and scale risk.

When these risks are overcome, the information infrastructure will become the foundation for free trade in services—knowledge-based services—just as the transportation infrastructure has been the underpinning for free trade in goods, with all the benefits thereof.

Sustainable Democracy

Charles M. Firestone[1] and Katharina Kopp[2] of the Aspen Institute Communications and Society Program

"AGENDA FOR ACTION"

The Communications and Society Program of the Aspen Institute[3] commends the Information Infrastructure Task Force for creating the "Agenda for Action," as it sets forth in clear and concise form the issues and tasks ahead for the nation in further developing its information infrastructure. Defining the issues is essential to enabling others to participate in the policy process. Moving forward to the tasks at hand provides connective tissue to the skeletal outline of the issues. Clearly

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1 CHARLES M. FIRESTONE has been the Director of The Aspen Institute's Program on Communications and Society since December 1989. The Program is a neutral forum for public policy conferences and seminars relating to the impact of the communications revolution on democratic institutions and values. As Director of the Program, Mr. Firestone is responsible for all of its operations. Prior to his position with the Aspen Institute, Mr. Firestone was a private communications and entertainment attorney in Los Angeles, and the Director of the UCLA Communications Law Program from 1977 to 1986.

2 KATHARINA KOPP is the Program Associate of The Aspen Institute's Communications and Society Program in Washington, D.C. She assists the Program director in planning, designing, and implementing all the Program's conferences, reports, and other activities. Prior to working for The Aspen Institute, Ms. Kopp worked in book publishing and in television in Germany and the United States.

3 The Communications and Society Program is one of several public policy programs of The Aspen Institute. The Institute is an independent, non-partisan, non-profit international organization whose purpose is to enhance the effectiveness of leaders to address the complex issues that are emerging within our global community. The Communications and Society Program's missions are (1) to serve as a neutral forum for divergent stakeholders to assess the societal impact of the communications and information sectors, particularly with respect to democratic institutions and values; (2) to help bring about integrated and thoughtful decision-making in the communications and information policy fields, and (3) to benefit society at large by the process. The Institute itself does not take or endorse partisan positions on political issues.

more will have to be added by the many constituencies who have been invited to join in this important effort to design the nation's new information landscape.

The purpose of these comments, however, will not be to add that flesh, as others are more able and appropriate to do so. There is no point in adding one more recitation of the blue sky dreams of technological possibilities. Rather, these comments will provide a broader context for the new agenda, and suggest the creation of democratic benchmarks against which to measure success of the new policies.

THE NEW INFORMATION ENVIRONMENT

While the metaphor of an information highway has certainly caught the nation's attention in describing the information infrastructure, the "Agenda for Action" takes a more expansive approach. It defines the National Information Infrastructure as inclusive of not only the conduit, but also the information content, applications, regulatory standards, and, most importantly, the people who will be interrelating with the varying forms of information in the future. In that way, we would suggest, "Agenda for Action" goes beyond the highway metaphor to an environmental one.

That is, as in other areas of economic development, attention needs to be paid to the environment through which a highway winds, or within which buildings are constructed. By addressing the information environment from a more holistic perspective, the nation can coordinate its goals and policies—its conduit policies, its attitudes towards the flow and protection of information, and its use of these resources to advance the country's prosperity and core democratic values.

A NEW REGULATORY PARADIGM

Another way to view the environmental metaphor is to consider the broadly-defined information infrastructure as a complex adaptive system. Under this view the technology, the applications, and the regulatory schemes of the information environment are each co-evolving, adapting,

and reacting to the evolutionary developments of each of the others. The point is not to force this metaphor, but rather to suggest that new paradigms are appropriate, even necessary, for the government and others to contend with the rapid and profound changes which are altering our private and public lives. By moving beyond the highway analogy, the Task Force has provided a broad context and expansive view of the new landscape. We suggest that it would be well served by further defining the new paradigms for government and citizen involvement.

SUSTAINABLE DEMOCRACY

While the "Agenda for Action" sets forth goals and strategies for the government's role in the new International Information Environment, it could have a more coherent thread running through these policies. This thread might be the concept of "sustainable democracy"—the maintenance of core democratic values for present and future generations in the face of the development of the information infrastructure. The "Agenda for Action" is consistent with this vision. But it lacks the overriding paradigm; and it perhaps shortchanges the need for policies to enhance communal and equitable values. The remaining discussion expands on this point.

DESIGNING DEMOCRATIC POLICIES FOR THE NEW INFORMATION ENVIRONMENT

The goals and workings of democratic societies can be variously expressed. We find that five core values must be balanced in one degree or another by the workings of government. The first four are liberty, equality, community, and efficiency. In each case, promotion of one value can take away from one or more of the others. In addition, a democratic process must involve participatory access, a value that can enhance each of the others.[4]

4 For example, a policy strongly favoring liberty will strain efforts to achieve equality. Accordingly, libertarian policies such as freeing businesses from regulation (continued on following page...)

STAGES OF COMMUNICATIONS REGULATION

As one reviews the modern history of communications regulation, particularly in the broadcasting, telecommunications, and program production businesses, two distinct but overlapping regulatory regimes emerge—each emphasizing different core values.

Stage 1. The first regime was highly regulatory of the centralized, largely oligopolistic businesses that dominated their fields. The broadcasting networks and other owners of local broadcast stations were licensed as trustees for the public. AT&T and the other local exchange carriers were highly regulated as common carriers, and even the film production companies of the 1940's were subject to an extensive antitrust regulatory action in the Paramount consent decree.

Stage 1, then, was the regulation of scarcity according to the "public interest." The pressure point for regulation was at the gatekeeper. The agenda was, by and large, set by the attorneys, contesting what should or should not come within this regulatory and legal standard. The policies of local licensing, universal service and rate regulation sought mainly to serve the democratic values of community and equity, and to a lesser degree, efficiency. They fell short on the values of liberty (as broadcasters were heavily licensed) and participation (audiences did not even have standing to participate in licensing activities until 1966). And as suggested below, the goal of efficiency was not well met.

Stage 2. With the emergence of more outlets of communications—through advances in satellite, microwave, cable, and customer premises equipment—came a new regulatory attitude. Common carrier rate-of-return regulation became cumbersome and inefficient

4 (...continued from preceding page)
could lead to the inability of some to gain equal access to those business offerings. In the communications carrier sector, government has chosen to adopt regulatory policies, of varying degree, to promote equity through universal service concepts, and thereby limit the liberty of businesses to price strictly as they choose. This policy has relaxed recently as ways are found for universal service to be achieved under a regime that still allows for a fair amount of freedom from regulation. See generally, J. O'Toole, The Executive's Compass (Oxford University Press, 1993).

when compared to pure competition. Cable television could no longer be constrained by regulation that favored over-the-air broadcasting. And television production became easier and more successful when a plethora of independent producers could apply their talents. The era beginning in the late 1960's through the 1980's saw proliferation and competition in virtually every area of communications and information delivery. At the same time the structure of the communications industries began to decentralize. According to George Gilder's law of the microcosm, power moved to the extremities, typified by the personal computer. The gates of information moved closer to the user.

Thus Stage 2 was an attempt to regulate in an era of emerging communications abundance. The regulatory response was deregulation to promote competition, which was thought to be, and in most cases is, more efficient than regulation. The new agendas were set and argued by economists: What is efficient? What is competitive? And the values of efficiency, liberty, and to a greater extent than Stage 1, participation were highlighted. Yet, in doing so, the traditional values of equity and community have taken a back seat.

FUNDAMENTAL CHANGES

"Agenda for Action" describes a variety of trends and actions that signal a new era of communications from the previous two stages. As the Communications and Society Program views these trends, rapid changes in technology, economics and organizational structures all suggest that a new paradigm of governmental interface with the communications and information sectors is appropriate.

The technology of digitization and convergence makes it difficult if not impossible and non-sensible to distinguish, as in the past, on the basis of delivery technology. The economics of commodification of information, concentration and fragmentation leads one to question whether traditional marketplace economics is sufficient for the new world of communications. And the increasing ability of users to access the sources of information directly has jeopardized the role of traditional

gatekeepers of information. The gates of information can now move all the way to the user.

Stage 3. Thus, the task of this Administration is to accurately identify the key ingredients of a new stage of regulation. If Stage 1 was the era of scarcity, and Stage 2 the era of abundance, then how should one characterize Stage 3? Today, one encounters simultaneous centrifugal and centripetal forces in technology, economics, and in organizations. More than abundance, one now faces, in Christopher Dede's words, information immersion—from information overload to virtual reality. And to remain viable, intermediary institutions, former gatekeepers of information, are becoming systems or audience integrators, knowledge navigators, and symbolic analyzers.

The analogy of the information infrastructure to the environment offers the opportunity to take a broad look at the role of communications within a democracy, to preserve diversity in information settings, to recognize the applicability of co-evolving systems, and to adapt to constantly changing conditions. We suggest that the Administration consider in one form or another a policy of "sustainable democracy." The new paradigm might very well retain some elements of the prior two stages of regulation/deregulation. But it should be flexible and fluid enough both to contend with rapid change and to balance all of the core democratic values.

GOVERNMENTAL TOOLS

The government has a variety of devices to employ in promoting democracy and prosperity in the new information environment. "Agenda for Action" recognizes the primary importance of private sector investment in and operation of the infrastructure. Nevertheless, it suggests that there is also a role for government investment, incentive and regulation. It is not our purpose to critique specific policies mentioned in the document. But it would be useful to emphasize some of the most pressing needs for governmental involvement in enhancing democratic opportunities for citizens interacting with the new information landscape.

We concur that universal access is a core concept, fostering both equity and liberty. One of the most difficult issues facing the Adminis-

tration will be a determination of what forms of information and programming should be available to all at little or no cost—an information commons or electronic library to enhance personal growth and communities of the future. How does the concept of universal service and access move from rhetoric to specific services made available to all the people? What formulas will allow for fluidity in defining universally accessible rights, services and properties? And who should pay for it all?

Furthermore, "Agenda for Action" recognizes the need to empower people to use the infrastructure. This should include not only user and consumer perspectives in the economic elements of the infrastructure policy, but also enhancement of civic and non-commercial aspects of the NII. In all of these and the many other applications for the information infrastructure, the promotion of information literacy—the ability of citizens to access, analyze, and produce information for specific outcomes—will be crucial to its ultimate success.

With these concepts in mind, the Communications and Society Program recently embarked on a project to design an Information Bill of Rights and Responsibilities.[5] We would suggest that the government adopt such a document to use as benchmarks against which the success of the information infrastructure policies can be measured in democratic terms.

CONCLUSION

In sum, the release of "Agenda for Action" is a first step in involving the general public in designing a new scheme for the emerging information environment. As the thesis of these comments is that the relevant paradigm is an evolving and dynamic one, it only makes sense that the process for evaluating the government's role would also be ongoing and evolutionary. This process should also emphasize the need to address and be evaluated against democratic principles and benchmarks. We are pleased to offer our help in this process.

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5 Towards an Information Bill of Rights and Responsibilities began in the Summer of 1993. The Institute will publish a set of "first principles" relating to communications, privacy, and information as property in 1994, along with a set of commentaries on each principle.

APPENDIX

List of The Aspen Institute Communications and Society Program Projects and Publications Relevant to the Information Infrastructure Task Force's "Agenda for Action"

The following projects of The Aspen Institute's Communications and Society Program relate to the efforts of the Information Infrastructure Task Force's activities to bring about a new National Information Infrastructure. Publications are indicated by an asterisk (*). In each case, the Institute convenes leaders from government, business and the non-profit sector to address in roundtable format specific communications policy issues, usually related to the societal impact of developments in the communications and information sectors. We list these as pointers to more thorough discussion of some of the points raised in the text of these comments.

1. The Aspen Communications Counsel's Forum is comprised of 25 general counsels or equivalents from competing businesses, government agencies and committees, and non-profit sector organizations. Since 1992 it has focused on a review and now a reformulation of the Communications Act of 1934. Its annual meeting each January results in a publication on its progress.

   * A Preliminary Review of the Communications Act, 1992
   * Towards A Reformulation of the Communications Act, 1993

2. The Markle Foundation has sponsored a series of projects on specific topics affecting communications and democracy. These include:

   * Towards an Information Bill of Rights and Responsibilities, forthcoming in 1994
   * Television for the 21st Century: The Next Wave, 1993
   * Towards a Democratic Design for Electronic Town Meetings, 1992
   * SeniorNet Services: Towards a New Environment for Seniors, 1991
   * Electronic Media Regulation and the First Amendment, 1990
   * Online for Social Benefit, 1989

3. The Annual Aspen Conference on Telecommunications Policy is held each summer in Aspen, Colorado. The Ninth Annual conference will be held in 1994, and will address the variety of issues associated with The Globalization of the Infrastructure. Prior reports of direct relevance are:

   * Shaping the Future Telecommunications Infrastructure, Ideal Visions and Practical Policies, 1990
   * Towards Consensus on American Telecommunications Policy, 1991
   * Competition at the Local Loop: Policies and Implications, 1992
   * Competition at the Local Loop: Options for Action (with special appendix on funding universal service), 1993

4. A new Aspen Roundtable on Information Technology has, for the past two years, explored new theories and concepts as applied to the advances of information technologies. In the first two years, this has included applying the theories of co-evolving complex adaptive systems to application of information technologies in the workplace and social settings.

   * The Information Evolution: How New Information Technologies are Spurring Complex Patterns of Change, 1992
   * The Promise and Perils of Emerging Information Technologies, (with an appendix on "Informed Participation") forthcoming in 1994

5. Education and Telecommunications. The Program has looked specifically at ways that telecommunications and information technologies can be used to enhance the learning process, broaden access to quality education, and otherwise to aid the continuing education of all citizens. The most pertinent reports for "Agenda for Action" are:

   * Media Literacy: A Report of the National Leadership Conference on Media Literacy, 1992
   * Telecommunications as a Tool for Educational Reform: Implementing the New NCTM Mathematics Standards, 1992 (funded by the National Science Foundation)

6. Occasional papers. In addition to the papers, reports and books issued in connection with the various projects of the Program, it also issues occasional papers which do not fit in one of its other publications. As this is a new activity, we have only two offerings at the present time.

   * E. Noam, The Impending Doom of Common Carriage.
   * C. Firestone, The Search for the Holy Paradigm: Regulating the Information Infrastructure in the 21st Century (prepared for presentation to the Computer Science and Telecommunications Board, National Academy of Sciences/National Research Council project on The Changing Nature of the Information Infrastructure, October 12, 1993), forthcoming in 1994.

Open Sesame! How to Get to the Treasure of Electronic Information

Francis Dummer Fisher[1]

THE GOAL

The National Information Infrastructure (NII) will permit anyone from anywhere to locate and interact with information in the form of sound, text, numbers and moving images, implying an interconnected network and universal service.

The paramount importance of this goal needs emphasis. Although listed as one of nine "principles and objectives" in "Agenda for Action," the other goals are not of equal weight. Protecting copyrights, promoting private investment, improved management of the radio spectrum and coordination with other governments are desirable but secondary. When making choices as to these lesser goals, we must always ask: what contributes most to the overall goal of the infrastructure?

The necessary characteristics of the NII can be vividly associated with a single example, suggested by the "Agenda:"

> *Jane, a high-school student, pregnant for the first time, uses her terminal to get the facts on how to have a baby of adequate birthweight.*

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1 FRANCIS DUMMER FISHER is a Research Fellow at the Lyndon B. Johnson School of Public Affairs, University of Texas at Austin. He is chairman of the Texas Telecommunications Group and has been an adviser on telecommunications policy to the Texas Department of Information Resources, the Austin Cable Commission, the Congressional Office of Technology Assessment, and the New York Telecommunications Exchange.

Home. Jane need not overcome the threshhold barrier of a trip to some public information center, but can have her questions answered in the privacy of her home at a time of her choice.

Universal service. Poverty does not exclude access. Society has determined that it is important to all of us that Jane be able to have this information and the means to connect to it.

Video. The information can be in the form Jane wants, probably "show and tell," with testimony of her peers.

Switching on an open system. Jane must be able easily to locate and be switched to particular information on the open system no matter who offers it. She is not dependent on others to decide what she needs and when.

Interactivity. Jane must be able to provide information and recursively specify just what information she wants.

The example also serves to suggest the social value of the information infrastructure. Two hundred fifty thousand babies below adequate birth weight are born in the U.S. each year. The cost of their care runs to about $30,000 per baby, for a total annual cost to society of $7.5 billion. Besides the immeasurable value of healthy babies, big monetary savings would be realized if pre-natal information could be accessed through the NII. And the example is only one of hundreds of preventive medical problems for which information is a big part of the answer. Rough estimates place the potential values in health, education and improved government services that could be addressed by more convenient and responsive information at several hundred billion dollars a year.[2] Too often the potential value of the infrastructure is measured by entertainment revenues alone.

The vision of the national "Agenda for Action," good as it is, can be expanded in three areas :

- Bringing electronic information into being,
- Locating where it is, and
- Getting to the information.

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2 Arthur Melmed and Francis Dummer Fisher, *Towards a National Information Infrastructure: Implications for Selected Social Sectors and Education*, Center for Educational Technology and Economic Productivity, New York University, 1991.

We start with information itself and then address how Americans can get to it. A common mistake is to start with the hardware and software and afterwards try and imagine to what purpose the system might be put. Let's keep Jane in mind.

I. BRINGING ELECTRONIC INFORMATION INTO BEING

The attention of government should be concentrated on information of social value. Entertainment and business information are apt to receive adequate attention without much public stimulation.

To assure information programs of social significance, government can:

- require the production of information and point to it,
- promote its production, or
- produce the information in government agencies.

A. Pointing at required information of public importance rather than processing it as "government information"

Collecting, storing and then disseminating "government information" is a process rooted in the old link between information and paper. And even when new technology has been introduced, the old patterns often persist, although "electronified."

For instance, to aid investors, the Securities and Exchange Commission (SEC) requires quarterly financial reports from corporations. Formerly these reports were submitted on paper, but now with much whoopla, SEC Project Edgar effects the same process by electronic filing and retrieval. A more forward-looking procedure would be for the SEC simply to require that corporations mount the information on the public electronic network. The data would then be maintained by those who know it best and could be updated more frequently. The SEC would prescribe the information and cease acting as collector, warehouse and distributor of "government information." The public would be better served, the expense of government reduced.

Of course, requiring that important information be made available to the public directly by private entities predates the computer and new telecommunications technologies. Mandated labels on cans and bottles of processed food itemize contents. Now an electronic information infrastructure could facilitate access to mandated information from distributed private data-bases. Information is important to the public, where it "resides" is not.

B. Promoting private production of information of public importance

Private enterprise, of course, will produce much information of public importance even if not required to do so. Government should foster this effort. Examples:

- Government should undertake basic research which benefits all, research in which private enterprises will underinvest. For instance, the government already undertakes "outcomes" analysis to discover which medical procedures really work. Private firms can then develop specific programs for informing the public of their options; such a program would tell Jane the characteristics of a healthy pre-natal diet. In education too, the government could support specification of desired outcomes and ways to measure the effectiveness of educational processes in reaching those ends. Privately produced learning programs in the new media would then be more tied to results than are existing text books.
- Government can structure copyright and patent laws in the new media that foster creativity and investment in information. "Agenda for Action" suggests this means "strengthening" intellectual property laws. But many computer programmers believe software would be better fostered if not subject to patent protection. Visual discourse over the NII might be better if fair use of copyrighted images were widened. Try and explain in a video program what you mean by "spiral" or the "Sphynx" without a picture.
- Government can exercise quality control, thus reassuring the public in its use of privately developed electronic information programs. The information Jane receives on pre-natal care must be the best that science can provide. A government stamp of approval on health

programs might be traded for a limitation on the liability of distributors.

C. Government production of information

Although setting requirements and providing incentives for private firms should foster the production of most information of public importance, information that is inherently governmental may have to be handled by the government itself. Examples would be election returns, legislation, regulations, judicial decisions, the census and other government statistics, as well as the results of the basic research just discussed.

Most laws and regulations in their linear paper form are comprehensive, spelling out all exceptions, special definitions etc. It takes an expert to ignore the provisions irrelevant to the case at hand. But when laws and regulations are reconfigured into an "expert system," a user can provide specific facts and receive a tailor-made answer of legal impact. So, more can be achieved than by the effort referred to in "Agenda for Action" merely "to convert [public information] to electronic form and disseminate it." The Internal Revenue Service is advanced in experiments with expert systems; its experience should be applied to laws and regulations throughout the government.

II. LOCATING INFORMATION: A SUPERHIGHWAY ROADMAP

Our very success in expanding the information universe, both in subjects and sources, makes it more difficult to find a particular piece of information. And those most in need of information need the most help in finding it.

Lessons from the limitations of telephone directories. The White Pages perform well the limited task of providing a telephone number if you know the precise name of the person or business you want to call. And the Yellow Pages provide numbers for easily classified businesses like "taxi" and "plumber." But the voice directory system fails to help us find who can answer a question or solve a problem.

This failure is especially serious for information of social importance held by public or non-profit agencies. Jane would get no help if she looked in the telphone book for the number of an agency which could tell her about prenatal diet. Of course, if Jane knew the exact formal title of the relevant public agency she might find a number in the Blue Pages, but nowhere will the number to call be listed under "baby" or "pregnant" or "diet."

Worse, telephone directories confuse listings of those who wish to make a profit from the call with those whose interest is only to help the caller. One information service that lists phone numbers in a newspaper gives a number for "teen age suicide." But callers who reach that number hear only some general information about suicide and are not told about the community suicide prevention hotline. Over one hundred "1-800" free health information services are listed in a pamphlet put out by the U.S. Public Health Service, but few can be found in any local phone directory.

Directories in the multi-media information infrastructure. As the information infrastructure evolves from voice to multi-media and as networks expand, information can be richer, but so can confusion. Different addresses (i.e. numbers) for the same source of information are now used by information providers depending on whether the medium is computer, telephone, television or wireless telephony.

But the same electronic technology that multiplies accesible information could help us find it, in several ways. It should permit an ease of cross-reference that is hard to effect with paper and linear text. It could help users locate information based on problems regardless of source. Jane, after all, could not care less, whether her advice on prenatal diet is in a computer nearby or far away, maintained by a local government or a national health agency.

The "virtual card catalog" of federal government information, proposed in "Agenda for Action," should be merged into a more general directory that could point to similar information maintained by others.

An electronic directory is able to circumscribe sources depending on the desired breadth of search, whether geographical or topical. It can shift on demand between the electronic directory of books at the U.C. Berkeley Law School to a listing of books in all the libraries

in the University of California system; it could search all over the world for information on a specialized subject.

Universal and Second-level gateways. In its proceeding on "video dial-tone," the FCC usefully divided the concept of gateways. In a universal gateway (or directory), any supplier of information would be listed. Second-level gateways would provide specialized search services or a grouping of offerings by different super-market information services (like Prodigy, Time-Warner or a state government).

The advantages of a universal gateway for the home user are unlimited choice of information, as well as the possibility, by moving to a second-level gateway, of relying on the selectivity of others. Competition among all suppliers of information, as well as competition among second-level directory services is enhanced.

One suggestion for the universal directory which avoids the burden of management discretion is to let any user designate their product or service with up to 10 key words, phrases or indicated cross-references to second level directories: *e.g.*, "Restaurant," "Thai," "South Austin," "Average Entree $6.95," "52 Hamilton St.," "11:00 am-11:00 pm," "Food Critic Reviews," "Advertisement including video of chef."

Directories as a public responsibility. The establishment and maintenance of the universal directory is inherently a public function. The failure of the free market, as evidenced in the Yellow Pages to offer adequate direction to sources of voice information of social importance should be a caution.[3] The difficulty of finding information on the Internet reminds us also that those who mount specific programs in a distributed electronic community do not pay enough attention to the common need of directory service. Management of the universal directory could be a state function, as has been suggested by Texas and by the National Association of State Telecommunications Directors or it could be required as part of universal service and offered by the local dominant broad-band

3 Francis Dummer Fisher, *The Austin Yellow Pages: Lessons for the Video Dial Tone*, comments filed in the FCC Video Dial Tone Proceeding, *In the Matter of TELEPHONE COMPANY-CABLE TELEVISION Cross-Ownership Rules*, CC Docket No. 87-266, Jan. 1991

carrier. Overall leadership and experiments in the design and management of directories, however, should be a federal activity.

III. GETTING TO THE INFORMATION: THE NEED FOR REGULATION TO ASSURE UNIVERSAL ACCESS AT AN AFFORDABLE PRICE

Even if a program that would answer Jane's questions about pre-natal diet existed and Jane knew where it was, she must still have the physical means of reaching the information: a terminal that connects to a network with the power to switch to interactive video information, all at a price that Jane can afford.

"Agenda for Action" states as a clear goal that all Americans must have "easy, affordable access to the new advanced communication and information services regardless of income, disability or location." And it points to the proper reliance on free market competition to bring this about—to the extent that it can do the job.

> Devising and attaining a new goal for expanded Universal Service is consistent with efforts to spur infrastructure development by increasing competiton in communications and information markets ("Agenda for Action" p. 8).

"Consistent" yes, but competition alone is unlikely to be sufficient.

In the "Agenda," the need for government action where market mechanisms fail is recognized in research and in the development of public applications, but the likely need for government regulation to assure universal service of the network itself is understated. In view of the voices of private business saying "get out of our way and competition will provide the electronic superhighway," the need for continued regulation of the infrastructure must be faced up to. Indeed it is only fair that businesses now making major decisions about mergers and investments be told what duties public regulation will place on them in the future.

> **Openness and Interconnection: Assuring any source of information a place on the NII and the right of customers to switch to it.** Today's voice network is open. Any information supplier or information user can call the phone company and get a line without

telling the phone company to what use it will be put. And any customer can dial any number in the world. Regulations assure these rights. Will it take regulation to assure the same openness in interactive video communications?

For a limited group of customers, businesses in concentrated urban settings, future competition may assure openness. But in the broad-band network to homes, for control of which a present struggle rages, one technology will likely turn out to be better and more cost effective than others—and expensive enough not to be duplicated. So, as in a gladiatorial contest, but one winner will emerge and not a continuing competition of the sort required to assure home customers low prices or an open network.

Interconnection—a new name for common carriage. The regulation that will then be necessary to assure openness (competition among producers of programs on prenatal diet and the right of Jane to be switched to the one she prefers) is likely to come in the form of a publicly enforced right to interconnect with the dominant network.

A manufacturer of peanut butter, if he has the best technology, can use it exclusively for his own production; we assume that others will soon come up with good alternatives. But alternative infrastructures are unlikely, so we all get to use the best one.

Protecting the right of interconnection will be especially important where the owner of the dominant network supplies both carriage and content. To steer customers to its own information products, it would be natural to make interconnection difficult for others or to seek to charge a price that exceeds the costs of carrying information, for itself and for others.

Universal service. The second reason for continued regulation is to assure universal service to those who can not afford it because they are poor or live in costly-to-serve rural areas.

Those who hoped that technology would do away with the need for government regulation are likely to be dissappointed. Federal policy makers should make sure that everyone understands this now.

Jane will be well served by the National Information Infrastructure envisioned in the "Agenda for Action." She would be even better served

with more social information, more easily found, to which her access was more assured.

Competition in Local Telecommunications[1]

Henry Geller[2]

The main role of the government is in the policy area. The goals of governmental policy are readily stated: to enable telecommunications to make a maximum contribution (1) to efficiencies because productivity is the key factor in the global competition that is now the norm, and (2) to the quality of life in the information society in areas like education, health care, telecommuting, and democratic processes.

Policies to implement these goals have become more difficult in light of the convergence of the telco, cable television, broadcast, computing, newspaper, and other industries. We have moved from the old AT&T end-to-end monopoly to, as stated, a network of networks, with many associated players. The two watchwords for this new milieu are interconnection and interoperability, so that for the user there is still a seamless system with no bottlenecks preventing access or undermining important First Amendment principles.

The basic strategies that have emerged in recent years are sound and, in my view, will remain sound for future achievement of the above

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1 Excerpt from Henry Geller, "The Government's Role in Developing the National Information Infrastructure: Necessary Policy Reforms," *CommLaw Conspectus 1* (Special Issue 1994).

2 HENRY GELLER is a Communications Fellow with the Markle Foundation, focusing on telecommunications policy issues and research. Mr. Geller is also a professor (of practice) at Duke University. Mr. Geller has served as General Counsel and Special Assistant to the Chairman at the Federal Communications Commission. From 1978 to 1981, he was Assistant Secretary of Commerce for Communications and Information, and Administrator of the National Telecommunications and Information Administration. Mr. Geller was also Director of the Washington Center for Public Policy Research, part of Duke University's Institute of Policy Sciences and Public Affairs.

goals. The difficulty has been in securing their full or effective implementation.

First and foremost is the strategy of employing competition—open entry. Competition is the norm in the U.S. because it spurs efficiencies, innovation and drives prices to marginal costs. It has worked brilliantly in the customer premises equipment sector, and has led to rapid modernization in the interexchange (IX) toll area, with massive investment in fiber optic and innovative marketing approaches. The problem area now is in the so-called "last mile" when the transmission leaves the IX highway and hits the dirt road of local telecommunications. Further, there are two large bottlenecks in local telecommunications—the local loop of the exchange carrier (LEC) and the coaxial drop of the cable television system.

The answer to the telco monopoly lies in the first strategy—*to permit and promote competitive entry.* Some states have done so, but many have held back because such competition upsets the political bargain that has existed for so long—LEC monopoly accompanied by low residential rates and compensating higher charges on business or local toll calls or for access to IX carriers. It can be argued that the states are laboratories and that over time, the laggard states will follow the lead of New York, Illinois and some others in promoting competitive entry. But the cost of such delay may well be too high a price in today's era of global competition. For that reason, there is a strong movement in Congress to remove state barriers to local telecommunications competition, and to require the states to promote such competition by affording effective interconnection to the LEC's network.[3]

As a necessary concommitant and balance, policies must also be adopted to permit the LEC to operate fairly and effectively in the new competitive environment. Prices for services can no longer send false economic signals, encouraging entry into high margin services and discouraging any competitive assault on those being subsidized; and this

3 See, *e.g.*, S. 1086, 103rd Cong., 1st Sess., Section 5, permitting the newcomers to co-locate their switches at the LEC Central Office and requiring the LEC network to be unbundled into its functional elements—transport, switching, and the local loop —so that the newcomer can obtain use of any of these elements on reasonable charges. In addition to this open network architecture (ONA), local number portability is to be achieved over time.

re-balancing must be done gradually over time to prevent undue disruption. Price regulation must be substituted for the now inappropriate rate-of-return approach. Pricing flexibility in the competitve areas and depreciation schedules fostering necessary modernization are in order.

Universal service remains a most important concept, and will continue to evolve over time, indeed finally including digital broad-band access. But it should be revised so as to target those truly in need, and be administered in a way that does not skew competition. That is certainly not true today. There are a number of approaches that should be given careful consideration.[4]

In the cable television area, steps have been taken to enable competition,[5] but the 1984 Cable Act still bars telcos provision of full competition, including telcos generation of content, in the telcos area of operation.[6] Congress should settle the issue by allowing such content entry but with a number of qualifications:

(1) The telco should not be permitted to acquire or hold any significant interest in a cable television system in its area of operation.[7]

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4 See, *e.g.*, Eli Noam's *NetTrans Accounts: Reforming the Financial Support System for Universal Service in Telecommunications,* Columbia Institute for Tele-Information, November 1993; Michael Einhorn, Dept. of Justice, *Recovering Network Subsidies Without Distortion,* Benton Fdn., October 15, 1993. See also the approach of Maryland (a deduction from the gross receipts tax on the carrier chosen by the subscriber to afford the state-defined universal service package; the charge for the package and those qualified to receive the subsidy are also delineated by the state). Finally, there is the use of the subscriber line charge.

5 See, e.g., the provision of section 628 of the 1992 Cable Consumer Protection and Competition Act (1992 Act), 47 U.S.C. 548, that vertically integrated cable programming be made available on reasonable terms to cable's rivals.

6 See section 613(b)(1), 47 U.S.C. 533(b)(1). Bell Atlantic has secured the right to engage in video content operation in its seven-state region as a result of its victory in *C & P Telephone Co. of Virginia v. U.S.*, 92-1751-A, E.D. Va., Aug. 14, 1993, appeal pending in 4th Cir. Other regional companies have instituted similar suits.

7 There should not, however, be any bar on joint construction of the fiber, such as is now done by competitors in the transoceanic cable, so long as the construction partners -cable, telco and possibly the power company (see The New York Times Mag., S. Rivkin, "Look Who's Wiring the Home Now," Sept. 26, 1993, at 46-47) —remain free to compete with one another.

(2) The telco must use a fully separated subsidiary for the content operation; there are no economies of scale or scope in joint operation since there is no need for joint maintenance or marketing or any joint and common equipment.

(3) There should be a requirement of common carriage for the operation by the telco parent company in the provision of video service.

This last requirement is of crucial importance. Common carriage operation facilitates transactions and markedly serves the First Amendment. It would mean that the print model is available for video publishing in the next century. Today anyone can start a magazine or newsletter, and distribute it widely through a common carrier (e.g., the postal service or the telephone line in the case of faxed news letters), with the market, not some distributor gatekeeper, determining the success of the offering. That same kind of bedrock common carrier system for video should be available in the next century, if we are to faithfully serve the crown jewel in the Bill of Rights—the First Amendment, with its underlying goal that the American people receive information from as diverse and antagonistic sources as possible.[8]

There is also the question of extending the common carrier concept to cable television. Two provisions of the 1984 Act, section 612(c)(2),[9] requiring leased commercial access and section 611(e),[10] making available PEG (public, educational and governmental) channels, do take away cable's gatekeeper role to some extent, but neither has yet proven out. The Act allowed the franchising authority to use the franchise fee for any purpose (pensions, potholes) whereas previously the FCC had

8 See *Associated* Press v. U.S., 326 U.S. 1, 26 (1945). Cable television has stifled competition to CNN in order to protect the interest of large cable companies in CNN. See H. Geller, *Fiber Optics: An Opportunity for a New Policy?*, The Annenberg Washington Program, Oct. 1991, at 19-20. This is in no way to say the bedrock telco operation should be preferred over other broad-band systems. All should be afforded a full and fair opportunity. Indeed, if with these "thousand flowers," it should develop that there is ready access for all providers, there may then be no need for common carrier operation. But we should not abandon this crucial safety valve unless and until there is clearly shown to be no need for it.

9 47 U.S.C. §532(c)(2).

10 47 U.S.C. §531(e).

required its use for cable related purposes, chiefly financial support of the PEG channels.[11] The leased channel requirement is so hedged that it has proven worthless.[12] Congress should remedy fully and clearly both these deficiencies.

Cable is about to enter the telecommunications field, most likely through personal communications service (PCS) or access provision. When it does, it will need interconnection to LEC facilities, particularly the bottleneck local loop. Such interconnection should be afforded on a reciprocity basis, and thus, wherever technically feasible, the LEC and other carriers should have access, on reasonable terms, to cable's bottleneck facilities, its coaxial drop and inside wiring.

Finally, to move on to the new world of fully open entry, policy makers must deal with a large "hangover" from the past, the restrictions in the Modified Final Judgment (MFJ).[13] The restriction on BOC provision of information content service appears to be finally gone.[14] The manufacturing restriction "parks out" the contribution of one-half of the U.S. telecommunications industry, and, with appropriate safeguards (including the continuing application of the antitrust laws to any BOC joint operation with a large manufacturer, domestic or foreign), should be eliminated.

The IX restriction is the most important and the most difficult. The BOC operation is confined to a LATA,[15] a wholly artificial concept at odds with the driving market, which, especially for business, calls of

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11 In the 1992 Act, Congress left intact section 622(i), 47 U.S.C. §542(i).

12 See Geller, op. cited n.8, at 18-19, for a full discussion of this point. In the legislative history of the 1992 Act, Congress noted this failure, and therefore required the FCC to adopt regulations specifying reasonable terms for leased commercial access. See §612(c)(4)(A), 47 U.S.C. §532(c)(4)(A). However, Congress failed to change any of the restrictive provisions, thus creating a most anomalous situation.

13 U.S. v. *Western Elec. Co.*, 552 F. Supp. 131, 227-28 (D.D.C. 1982), aff'd mem. sub nom. *Maryland* v. U.S., 460 U.S. 1001 (1983).

14 The BOCs have been free to provide such services for the last two years. U.S. v. *Western Elec.* Co., 993 F.2d 1572 (D.C. Cir. 1993), pet. for certiorari pending, *Consumer Federation of America v. U.S.*, No. 93-318, Oct. Term 1993.

15 The MFJ decisional process divided the Bell territory into 163 Local Access and Transport Areas (LATAs). *U.S. v. Western Elec. Co.*, 569 F. Supp. 990 (D.D.C. 1983).

one-stop shopping. As a further example, the IX restriction is a large roadblock to obtaining needed all-out competition in intra-LATA toll, a very large market now wholly dominated by the BOCS. To compete effectively, newcomers need "1-plus" dialing and pre-subscription. But if such parity is accorded and at the same time the BOCs are confined to the LATA, they will be at a huge disadvantage: Their rivals offer one-stop service throughout the nation and the BOCs offer service confined to the LATA. Clearly, the answer is, initially, to permit BOC resale of IX service outof region, required to be spread equitably among several IX carriers..

Policy makers face a fundamental issue: Should BOCs be let into IX when the competitive conditions mentioned above are in place (e.g., no barriers to entry; ONA, including access to the local loop so that the BOC advantage as to scale economies is largely eliminated) or should it be allowed only upon some showing of substantial market share for newcomers?[16] It is important to keep in mind that the test here is one for *entry*, not price deregulation, which is an entirely different policy matter. Further, if the share test is employed, it is likely that the IX problem will fester and persist well into the next century.[17] The IX restriction should be phased out over time, as the competitive conditions are implemented—first, within the region, then out of region with resale, and finally wholly ended.

There has been a long dispute whether the FCC has the right to forbear from regulation, where competitive conditions warrant such action. This issue should have been settled by Congress long ago.[18] Clearly, when effective competition results, regulation of pricing, etc.,

16 Thus, AT&T argues for the following test: that at least 75% of the BOC customers can get telephone service from at least two or more providers and that 30% take service from a provider other than a BOC. See *Telecommunications Reports*, Nov. 1, 1993, at 16-17.

17 This estimate is based on AT&T's experience, where, even though its share has fallen by at least a third and there is 800 number portability, it remains subject to price (tariff) regulation—an outstanding example of "regulated competition," referred to within.

18 In the Omnibus Budget Reconciliation Act of 1993, Congress did provide for such forbearance in the mobile field. See §332(c)(1), 47 U.S.C. §332(c)(1).

through tariff filings is not needed. To continue such "regulated competition" is really cartel management by the government.

Finally, there is the matter of spectrum allocation. Progress has been made in spectrum *authorization* through the competitive bidding process now permitted in sectors like Personal Communications Services (PCS) where the licensee receives compensation from subscribers.[19] This process should be extended to other appropriate areas, including the television broadcasting sector. But the *allocation* process remains much too wedded to block allocation, that is, to the setting aside of blocks or bands of frequencies for specific uses. This is a very dynamic field. It is not possible for any regulators, however expert, to make judgments that will be sound over time. Indeed, the present system is reminiscent of Gosplan, the old Soviet union planning scheme. It would be much sounder to increase flexibility in technical standards and in choices for users in employing their assigned spectrum.[20] This was done with great success in the cellular bands, is now authorized for PCS, and would have been most helpful if it had been available at the 2 GHz range, instead of specifying, say, use only for fixed microwave.

Clearly related to the above discussion is the associated goal of fostering the provision of information services over these evolving telecommunications networks, especially in the areas in which the government is directly involved, such as education, health care, maintenance and improvement of democratic processes, and achieving the most equitable and widespread dissemination of important governmental information to all persons, however and wherever situated. As much as possible, we must become a high performance people, and to that end, we need not only the above high performance networks but, equally important, the provision of high performance services which contribute significantly to high performance in education, health care, and similar civic sectors.

Congress should therefore provide funding not only for pilot projects directed to the development but also to the widespread delivery of these services. For example, there could be the allocation for this purpose of

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19 See §309(j)(1), (2), 47 U.S.C. §309(j)(1),(2).

20 See NTIA, *U.S. Spectrum Management Policy: Agenda for the Future*, Chap. 3, Feb. 1991.

a significant portion of the funds obtained from the auction of the spectrum to be reassigned over the next decade or so from the government side to non-government use. These funds stem from the telecommunications sector, and it is therefore most sound that a substantial portion be used to deliver vital educational and similar services to the American people. There is a close—indeed, a unique—fit between the auction of the spectrum and the use of the funds and the spectrum to benefit the present and future generations of Americans.

Along these same lines, there is the need to consider the funding of public service television programing. Mention has already been made of the proper use of the cable franchise fee to support PEG channels. This could be done in connection with the local public television station, whose resources could be used to provide support for a local C-SPAN governmental channel or an educational channel. Indeed, some portion of the fee might be aggregated nationally for a cable ready-to-learn channel.[21]

Finally, there is the need for augmenting the support for the public telecommuncations service.[22] This need ties in directly with the desirability of a major revision in the regulation of commercial television. In the face of the enormous changes that are now occuring, it would be anomalous to keep regulating one area, commercial television, in a wholly different manner, as if it stood alone and was unaffected by such drastic change. It would be much preferable to eliminate the asymmetric regulation of commercial broadcasting by substituting for the public trustee obligation the requirement to pay a modest spectrum usage fee (less than the cable franchise fee), to be used to augment the funding of public telecommunications (i.e., over the air, cable, cassettes, etc.).[23]

The discussion has focused largely on the immediate steps that are needed to clear the way and to promote the fullest possible development of the NII. What is most commendable is the attention being paid at the highest levels of the Administration to this important task. With such

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21 See Ernest Boyer, *Ready to Learn, The Carnegie Foundation for the Advancement of Learning,*, 79-107, 1991.

22 See *Quality Time: The Report of the 20th Century Task Force on Public Television*, 1993.

23 For a discussion of this approach, see Geller, op. cited, n.8, at 23.

focus and the realization by the Congress that events are fast overtaking the Congressional tendency for hearing after hearing, there may finally be the major reform steps so long needed.

Extending Universal Service Through The NII

Susan G. Hadden[1] for the Alliance for Public Technology

The second of the Principles and Goals for Government Action outlined in the NII "Agenda for Action" calls for extending the concept of universal service to ensure that information resources are available to all at affordable prices. The action to be taken is to develop a new concept of universal service. In this paper, we describe in some detail our vision for universal service as well as some specific actions and approaches that government needs to take to reach that goal.

In an earlier position paper, "Connecting Each to All," the Alliance for Public Technology outlined a vision of universal service that it called a broad-band telecommunications platform. In addition to its broad-bandwidth, we called for the platform to offer digital switching, interoperability, security and reliability, and usability. We also argued that the platform should offer universal service to the home, protect privacy and intellectual property, and be based on common carriage. We argued that the benefits of such expanded universal service are enormous in terms of increased economic development and competitiveness, in terms of fuller political and social participation, and in terms of expanding markets for entertainment and self-education.

We continue to believe that universal service must consist of broad-band service to and from the home, because the nation will not realize the full benefits of the NII unless everyone is connected, and connected

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1 SUSAN G. HADDEN is a professor at the LBJ School of Public Affairs, University of Texas at Austin and a member of the board of the Alliance for Public Technology, an organization of organizations devoted to ensuring widespread public access to the full range of new telecommunications technologies. She is the author of two books: *Read the Label: Providing Information to Reduce Risk* and *A Citizen's Right to Know: Risk Communication and Public Policy*. She has also published over sixty articles on telecommunications policy, citizen participation, risk communication, and policies intended to reduce risks to human health or the environment.

not just at work or school but at home, where people can make use of services in privacy and comfort, at any hour, while tending children or relaxing. In this paper, therefore, we expand upon and elaborate our vision and, especially the governmental actions we believe are necessary to achieve that vision in an environment where technology and business relationships are changing almost daily.

WHAT TELECOMMUNICATIONS SERVICES SHOULD BE "UNIVERSAL"?

Universal service is the level of telecommunications service that public policy declares should be available to everyone at a reasonable cost—the minimum for equal participation in the economic, social, and political life of the nation. Universal service is a matter of public policy because the unaided marketplace cannot ensure either ubiquity or reasonable cost; yet if some people are left off the network because of geography, income, or disability, the full benefits of the network will not be achieved. To make the point in the most basic terms, the marketplace itself will be smaller by the number of people not on the network.

Universal service incorporates two related elements. By serving everyone, the power of the network increases for all and no one is deprived of service for want of money. These two aspects we term "universality" and "fairness." As now implemented, universal service now has a strong welfare component; that is, fairness has supplanted universality as the perceived basis of the policy. But the history of universal service suggests that it was the economic and social benefits of everyone having a telephone that initially drove the policy. As we move towards an expanded version of universal service, we should emphasize first universality, then ask if supplementary policies are necessary to achieve fairness.

Our vision of expanded universal service incorporates the following elements, each of which builds upon and assumes the earlier elements:

1. **Connectivity.** The full capabilities of the network should reach every home, school, library, business, hospital, and other institution.

2. **Features of the Network: Switching and Broad-bandwidth.** To bring the greatest benefits, the network that connects everyone should be

   - broad-band—capable of carrying video signals along with voice and data, and
   - switched—allowing any user to connect to any other or many others.

   The debate about universal service has been reopened precisely because it is feasible to offer these features, and a consensus seems to be emerging that they are also desirable. We would deplore any efforts to define the capabilities in terms of specific technologies (such as fiber optic cable), preferring instead to encourage innovation and cost reduction through competition among the many different technologies that could deliver these features.

3. **Openness.** Benefits will be further enhanced if the system is "open;" that is, if, in addition to receiving information, all users can send information and can specify the kind of information they want. One feature of openness is that it allows users to send video (and data), just as they can now initiate a telephone conversation. In contrast, a network that is not open could limit people to sending only specific kinds of messages, such as ordering merchandise shown on the screen or making a play in a game. Some commentators have suggested this would be like giving consumers a dirt path on which to leave their homes while commercial providers ride to them on the electronic superhighway.

   A second feature of openness allows individuals to tailor the search for information, just as they can ask ever-more-specific questions during a telephone conversation, zeroing in on the specific answer they need. In contrast, a network that is not open by this definition would offer limited power of selection, allowing people only to choose "channels" of information. If the particular bit of information they wanted was not on the first channel selected, they would have to search other channels, raising search costs beyond the level most people would bear.

4. **Interoperability: A Network of Networks.** In order to maximize benefits and ease of use, the network should provide for "interoperability" or compatibility—allowing users of different networks to communicate easily. Assume that "the network" will in fact be a "network of networks," owned and operated by different companies and perhaps comprising different technologies (for example, unwired technologies for rural areas; wired ones in densely populated areas). To achieve the benefits of universality—everyone connected to everyone else—customers of one network must be able to reach those on another network with ease. Reaching others with ease requires both compatibility between the "hardware" of the different networks and a uniform system of "addresses" analogous to today's telephone numbers or postal addresses.
5. **Accessibility: Getting on the NII.** "Accessibility" means the ability to use the network, regardless of the existence of a disability. Having a two-way broad-band network to the home will not be valuable to people who cannot use it because of inadvertent design barriers. Multiple access methods are necessary to account for differences in human capacities: some people cannot see well, while others may have difficulty typing or even using a remote control device. The key concept is redundant input and output. A variety of methods to control interface and to obtain the information or communication is essential to ensuring that each person will be able to participate in the economic and other activities available over the NII.
6. **Usability: Finding Information.** Another feature of accessibility we may call "usability." In using this term, we do not mean to imply that this feature is a "frill"—a nice thing that people might pay more to have. We are talking about a feature as critical as accessibility, because if people cannot find the information services or entertainment they want, the system is useless for them. Directories must allow people to identify the "stuff" they need and want rapidly and easily. To do this, the directories must allow a search of every area of the network, not just a limited channel of information. Imagine having to search three

or thirteen or five hundred "yellow pages" to find the source or service you require.

7. **Information Services.** Content is the reason for the excitement about the NII. Naturally, entertainment will also be an important component of available services. But to obtain full public benefits from the network, we will need "public service" information products such as personalized health tips or job training, and these products must be available at little or no cost. Some information may be so important that it will actually be considered an element of universal service, just as education through high school is "universal" under U.S. public policy.
8. **Privacy and Security.** People do not necessarily want others to know what kinds of information they have sought on the network or that they are receiving instruction in adult literacy. Medical consultations should be strictly private. The network should also have safeguards against intrusion into people's homes or "computers." This element of universal service may be achieved through hardware or software means but probably requires legislative action to define the extent of privacy. Privacy should extend beyond individual rights with respect to government to include individual rights with respect to other individuals and corporations.

ACHIEVING EXPANDED UNIVERSAL SERVICE: GOVERNMENT ACTIONS

If the unaided marketplace would result in this kind of universal service, we would not have to have a public discussion about it. However, market incentives actually work against many of the most critical features of the network. For example, the higher cost of serving isolated areas has in the past discouraged universal connectivity. Similarly, the apparently small size of the market which is the disabled community heretofore discouraged development of telecommunications methods that were accessible to all. The Alliance for Public Technology believes that interoperability, finding information, full two-way communication, and many information services such as health, education, and

emergency response are unlikely to be provided by the marketplace without some public, governmental oversight.

Therefore, we believe that Congress should redraft the Communications Act of 1934, whose preamble laid the groundwork for today's form of universal service. The goal in the preamble is

> *to make available, so far as possible, to all people of the United States a rapid, efficient, nation-wide, and world-wide wire and radio communications service with adequate facilities at reasonable charge.*

A new preamble, we believe, should call for the following goal:

> *to enhance economic development and participation by making available to all people of the United States at reasonable cost a switched broad-band network that ensures full reliable and private two-way communication for each person, regardless of location or disability, and availability of appropriate public services and information locators.*

To achieve this goal, we believe that the federal and state governments will have to take several additional steps, many of which should be embodied in the new comprehensive telecommunications act. We outline the principles for these government actions in the following paragraphs:

1. Competition is not the same as deregulation. We want to promote competition, but we do not imagine a level playing field without any boundaries at all. To compete in the telecommunications arena, companies must:

    a. meet standards of compatibility/interoperability with other networks;
    b. meet standards of accessibility;
    c. ensure that customers can send as well as receive video, voice, and data messages;
    d. allow searches of their directories of services by customers of other networks; and
    e. provide for privacy and meet standards of network reliability.

2. All telecommunications providers must be regulated in the same way, regardless of technology. Universal service—and telecommunications regulation more generally—will no longer be defined by a particular technology or industry, such as telephone. Given the merger among telecommunications technologies and the growing mergers among telecommunications companies, regulatory distinctions among technologies are no longer tenable and should be abolished.
3. All telecommunications providers should contribute to a universal service fund, which should be administered by an entity which is itself not a provider.
4. Service to homes must follow a common carriage model so that individuals can originate video, voice, and data messages as well as receive them.
5. Governments should prepare to deliver their services over the network, simultaneously guaranteeing demand for carriage and helping to create "public service" information applications that will be difficult for the private sector to create. Developing information services that take full advantage of the new capabilities of the NII is time-consuming. Take as an example preventive health care: although general lifestyle information may be useful, most people will seek out information on avoiding a particular disease or condition. Information on that disease must be credible and accurate, available in voice and pictures, and allow for users to obtain information in many degrees of detail as well as to pursue related topics easily. Multiply this by hundreds or thousands of health conditions, and then consider all the other kinds of services governments now deliver, from environmental permitting to professional licensing. All of these services could be faster, cheaper, and more effective using the new telecommunications, but governments must plan to take advantage of the capabilities of the network. They cannot do so unless they are committed as a matter of public policy. But this commitment in turn will reassure investors in the NII that demand will be adequate to yield profits, thus hastening needed investment.
6. Providers must provide price information about their services in a standard way to allow consumers to make accurate compari-

sons. Without such government standards, providers will attempt to fool consumers by bundling different packages of services or providing prices about different services, as occurred when long-distance telephone service was deregulated.

7. Regulators must devise policies to govern the transition between the present networks and the NII. Transition policies must cover continued availability of plain old telephone service at reasonable rates, even if the network delivering telephone service is an advanced one. Transition policies must also consider communications among those on the NII and those whom it has not yet reached, assuming that it will be phased in over several years.
8. Regulators must develop standards for pricing that encourage equal use of the network. For example, network operators will presumably continue to charge for carriage. But will it be based on distance, time, or bandwidth? If bandwidth, will people with low incomes be deterred from using the broad-band services necessary to transport information in its most natural and easy-to-use form? Similarly, how will information be priced so as not to exclude low-income users? It seems likely that some information will be provided free, such as advertising, reservations services, sales, and, as discussed, some public service information. Other information, such as movies or stock quotes, will doubtless be available only for a fee. Which services will be included in the definition of universal service?

In putting forth these principles, our major point is to show that inherent in the goal of universal service, no matter how defined, is the need for public action. Any policy that intends to reach every person—and any policy that increases societal benefits if more people are included under its umbrella—is by its very nature public and governmental.

The Alliance for Public Technology believes that the additional benefits from having every person connected to the network, regardless of location, income, or disability, are so great that they dwarf any costs of public oversight. But these benefits will not be attained if one technology or one industry is regulated while others are not; instead, the benefits will accrue only if all providers are regulated equally. Universal service requires universal servers.

The National Information Infrastructure Report: A Welcome Call to Action

Allen S. Hammond, IV[1]

INTRODUCTION

Coming in the midst of the telecommunications revolution, the Administration's initial Report is a welcome call to engage in the critical debate about the nation's future. As technologies and information streams converge and corporations propose mergers of increasing magnitude, it is crucial that the government provide key fora in which democratically derived goals and policies may be formulated and implemented. In such fora, fruitful efforts may be undertaken to respond appropriately to the increasing evisceration of regulatory distinctions and market boundaries. And, effective protections fashioned to assure increased access and electronic speech for network providers and users alike. The Clinton Administration is to be commended for providing such a forum, and for its stated willingness to work with Congress and the states in bringing about meaningful deliberation and change in other fora.

Given the speed with which technology, industry and market competition are pressing change, however, the provision of a much needed forum may prove insufficient. Consequently, the timely articulation of principles and objectives as well as the identification of methods

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1 ALLEN S. HAMMOND, IV, Director of New York Law School's Communications Media Center, is Associate Professor of Law at New York Law School. Professor Hammond has served as Attorney and Program Manager at the National Telecommunications and Information Administration, General Counsel for WJLA-TV, Senior Attorney for the Media Access Project, and Associate General Counsel at MCI Communications Corporation. His most recent articles include "Regulating Broad-band Communications Networks," 9 *Yale J. on Reg.* (No. 1) (1992), and "Diversity and Equal Protection in the Marketplace: The *Metro Broadcasting* Case in Context," 44 *Ark. L. Rev.* (No. 4) (1991).

by which they may be achieved are critical. Again, kudos to the administration for starting the much needed national debate process.

A. THE REPORT

The report entitled, *National Information Infrastructure: Agenda for Action (Report)* identifies four principal policy goals and five major action areas. The four principal policy goals are: reliance on private sector investment; support for universal service; promotion of technical innovation and new applications; and promotion of a seamless user driven NII. These goals are to be accomplished via reformation of government regulatory policies concerning: information security and network reliability; improved spectrum management; protection of intellectual property rights; increased domestic and international inter governmental coordination; and enhanced access to government information concomitant with improvement of the procurement process.

B. GOALS

1. Privatization

The policy goals possess significant elements of pragmatism and equity in principle. Their ultimate articulation must also include meaningful acknowledgement and protection against dangers inherent in extensive privatization and the tendency to equate "user driven" with "market driven" operation of the NII. Concern has properly been raised regarding the impact of privatization on government and public information as well as access to technology and its almost certain transformation of the economic haves and have nots into the information haves and have nots, binding and isolating these individuals and communities into enclaves ever more distant from the larger society.

2. Universal Service and the Public Interest

Universal service is a critical goal to be defined and amplified commensurate with the anticipated merged multi-media service environment, tempered by socially equitable economic considerations.[2] However, it should not be the only public interest goal to be transplanted from its pre-convergence regulatory soil. As technologies, information streams, markets and ultimately regulations converge, serious effort must be given to the protection of the public's interest in access to local and national news and public affairs (broadcasting); access and video speech options beyond subscription to one-way down stream information flows (public, educational and governmental access channels in cable); and, a mechanism for acknowledging the evolving nature of "basic service" (telephony), albeit now, in an increasingly multi-media context.

How will the subsidies for such services be maintained in an evolving subscription environment in which purchase of a multi-media receiving device does not afford the same access to information afforded by televisions and radios today? How do we assure access to technology, information and opportunities for meaningful communication in a society as economically, culturally and geographically diverse as our own? There is a critical role for government in actively encouraging private and public efforts to harness technology in the pursuit of reduced access and usage costs, expanded geographic availability, enhanced user utility and consequently, expanded speech opportunities.

3. Access to Technology and Intelligence

In its efforts to promote technological innovation and new applications, the government must not lose sight of the important role it already

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2 While the debate over how to define and finance universal service continues, it seems clear that universal service will require the existence of a "network of networks," and recognition that there must be economic incentives and a measure of economic equity in order to assure that firms which provide access on a common carrier basis have the continued ability to provide cost effective service to all. At minimum, firms providing such services should receive tax incentives and limited liability for injury or loss to the information they carry. By the same token, firms engaging in service to a select number of customers as opposed to the general public, should not receive such incentives and exemptions.

plays in setting the technical parameters of access policy. In particular, efforts undertaken in the intelligent network and comparably efficient interconnection arenas can have a profound impact on the development of a third level of access to the networks of the future. The ability to reconfigure the network based on user need/interest would enhance individual and collective electronic speech even as it stimulates new uses of and services on the networks. Indeed, it creates a new level of potential speech activity because the utility of the network to the user becomes less dependent upon the network owner's ability to anticipate user needs thereby indirectly [or purposefully] constraining user speech options. It is critical that the Administration acknowledge and protect these budding access rights not only for the large corporate customers capable of leveraging economic and political clout into industry acquiescence, but also for the individual users.

REGULATORY AND POLICY REFORM

As earlier stated, the administration is to be commended on its identification of five methods by which it may begin to accomplish its goals. There are other areas of regulatory implementation or reform which the administration should consider as well. They include the development of:

a. an integrated electronic speech regulatory policy embracing multiple technologies, media and markets;
b. a technology/industrial policy that acknowledges the articulated needs and interests of large corporate users and network owners but gives equal attention to the facilitation of economic development through the creation and support of viable, ultimately self sufficiently small, minority and women owned telecommunications businesses to accomplish many of the Administration's goals regarding infrastructure development, education and service delivery in urban and rural areas; and
c. an over-arching national policy which relies on competition but tempers reliance with continued vigilance regarding market failures, unfair competition and the dangers of privatization while

elevating electronic speech policy to the same level of consideration as technical and industrial policy.

ELECTRONIC SPEECH POLICY

Increased Access and Speech Opportunities

A broad-band communications infrastructure will be every American's tool of personal emancipation; will generate a quantum increase in Americans' freedom of speech...and freedom of ideas; will allow Americans to recapture, yet expand upon, the democratic tradition and community spirit of the early years of this nation...[3]

Today, telecommunications network technology augmented by computers, telephones and fax machines, is increasing network users' access to the public switched network and control of the information transported over it. This increase in access and control is manifest in enhanced opportunities to engage in electronic speech, assembly and association activities for the purposes of creating and sharing information.[4]

The increased opportunities for electronic speech, assembly and association are also facilitated by several existing federal policies.[5] These

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3 Communications Competitiveness and Infrastructure Modernization Act of 1991, Title I, §101(14).

4 For instance, it is recognized that as greater amounts of intelligence are migrated from central office switches to other locations in public and private networks, the opportunities for user creation, manipulation, dissemination and sharing of information increase. As a result, federal policies regulating the distribution of intelligence in advanced intelligent networks merit serious attention. These policies determine in part, the specifications and standards for the equipment in which the intelligence will be housed, who may manufacture, own or have access to the equipment, and the manner in which the equipment may be incorporated into existing and future networks. In the process, the policies will determine how and to what extent network user/subscribers will acquire access to the network.

5 Over the past 30 years, modernization of telecommunications network technology has also stimulated increased economic growth and consumer benefits in the United

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policies intersect in several key interrelated areas of the public policy debate concerning future telecommunications networks. The first area concerns the transition from current telecommunications networks to advanced intelligent networks.[6] The manner in which state and federal network competition and privatization policies allow AIN networks to develop will set the outer limits of the opportunities for greater user access and control.

The second area is the transition from technologically separate, often mono-functional, one-way transmission networks for voice, data, and

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5 (...continued from preceding page)
States. It, arguably, has lowered inflation and increased the domestic and international competitiveness of U.S. firms. Moreover, the continued modernization of our telecommunications infrastructure is viewed as a critical prerequisite to future economic growth as well as domestic and international competitiveness. For instance, it is estimated that every dollar invested in telecommunications infrastructure produces $1.50 of increased economic activity. This 50% return on investment is one of the highest known indirect industrial multiplier effects.

As part of its goal to use telecommunications to stimulate increased economic growth at home and enhanced competition at home and abroad, the United States is developing regulatory policies favoring greater access to local exchange networks, greater privatization networks, and trade policies seeking to enhance competitive posture of U.S. firms domestically and abroad. These policies ultimately affect the exercise of electronic speech and related activities for they affect the technical composition and configuration of the networks whose sole function is the communication and movement of information.

"Many of today's high-growth industry prospects lie with information-intensive industries whose ability to communicate is critical to their ability to conduct business." ECONOMY FILE. "...[C]ommunications power is absolutely key to productivity and competitiveness. In a mobile society such as ours—where US business is adopting Japan-style "just-in-time" manufacturing and Wal Mart style "just-in-time" inventory management—new communications capabilities will be critical. Remarks of Alfred C. Sikes, Chairman, Federal Communications Commission, before the National Cable Television Association 4th Annual Convention and Exposition, Tuesday, May 5, 1992, Dallas, Texas, at p. 3.

6 Policies addressing the evolution of the intelligent networks seek to assure enhanced service providers and users, network access and interconnection which is technically and financially equivalent to that which the network owner/provider enjoys. For instance, today, the Bell Operating Companies are operating under Open Network Architecture (ONA) guidelines established by the Federal Communications Commission in the 1980's. ONA was intended to give enhanced service providers, such as voice messaging services, as well as on-line data services such as Prodigy and Compuserve, fair and equal access to the local exchange portion of the public switched network for provisioning their services. See, Dawn Bushaus, Enhanced Services—ONA and AIN on Collision Course, CommunicationsWeek, Computer Networking Section, p. 32L, June 17, 1991.

video information, to broad-band, multi-media, multi-functional, interactive networks based on the convergence of antecedent distribution technologies and information streams. Here, the same policies which set the outer boundaries of access and control in the intelligent network context, determine who is likely to have control of network access and speech as network intelligence evolves and network functions and information streams merge.

Concurrently, as fiber optic distribution and switching technology is introduced, the distribution functions and information streams of broadcasting, cable and telephony are merging. As they merge, the electronic speech and related activities which received constitutional protection when conducted over the antecedent technologies will come to reside on the merged network(s). However, because the apportionment of these constitutional speech rights was made in the specific contexts of antecedent technologies, the fate of such rights in an advanced, intelligent, broad-band network context is unsettled.[7]

Yet another trend in the evolution of electronic speech rights is the regulation of "unprotected" speech. As electronic speech activities have expanded on broadcasting, cable and telephony, the federal government has sought to assert greater control over the spread of indecent speech. One of the preferred methods of extending control over such speech is the lodging of responsibility and liability at the network provider level.

Finally, as the convergence phenomenon intersects with growing privatization, there is potential danger to access and broad based speech opportunities. Privatization of the technologies and networks can lead to the concentration of control over content in the hands of private network owners. Because of the historic tendency to equate speech rights with ownership of the means of transmission, privatization of the merging of technology, network function and information streams could effectuate a transfer of the current shared control over access and speech from the public/private constitutional arrangement to private and contractual

7 "Electronic Media Regulation and the First Amendment: Future Perspective, Data Channels," 19 *Computer Digest* (No. 3), Feb. 3, 1992

arrangements.[8] Such a result could be detrimental to the potential speech and access opportunities of existing and future network users.[9]

The confluence of these trends creates important opportunities for the increased exercise of electronic speech and related assembly and association activities by network owners, information providers and network users as well. Access to networks is increased while control over the creation, manipulation and movement of information is increasingly decentralized.[10] Paradoxically, they also create occasions for the potential loss of electronic speech rights. For instance, the implementation of indecency restriction schemes by imposing responsibility and liability on the network provider for all user speech increases concentration of control over electronic speech and its related activities in the network owner/provider. Similarly, judicial decisions that cable and local telephone network owners possess relatively unbounded speech

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8 Inherent in the status of the ownership is an underlying bundle of property rights which include control over who may have access to the network owners' facilities and/or services. While the degree of control over access varies with the type of owner, ultimately, as long as ownership includes the right to decide access, some segment of potential users are likely to be excluded for a variety of oft-times unrelated reasons ranging from particular pricing or service configurations, to equipment requirements, information format, capacity needs, or discrimination based on economic or normative value considerations based on content of speech.

9 Users may be divided into two major groups composed of facilities based and non-facilities based users. The vast majority of users are non-facilities based. These individuals, firms or groups have no ownership of the networks and services they use. They may purchase access to some of the networks (telephone) over which they may interact. They are most often semi-passive recipients of information transmitted one way over other networks (broadcasting and cable). The communications needs of these users vary substantially, are evolving at different speeds and in multiple directions. For instance, many businesses already have significant needs for high speed, high capacity broad-band communication networks. See, Dertouzos, *Communications, Computers and Networks*, 265 Scientific American 62, 64, September 1991; Gore, *Infrastructure for the Global Village*, 265 Scientific American 150, 152; Dertouzos, *Building the Information Marketplace*, 94 Technology Review 28, 31-32, January 1991. By comparison, the general public has not yet generated needs sufficient to precipitate demands for greater network speeds and capacities. Customer-users include residential as well as business customers.

10 User/subscriber access to and control of elements of the sub-network level are being determined in several proceedings currently before the Federal Communications Commission. See, Advanced Intelligent Network (AIN), Open Network Architecture (ONA), and Comparably Efficient Interconnection dockets.

rights would increase concentration of control over electronic speech and its related activities.[11]

These policies affect the evolution and exercise of electronic speech, assembly and association at the content, network and sub-network level. Moreover, they do so at a time when domestic and global reliance on electronic speech as a substitute for more traditional forms of communication is growing.[12]

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11 Recent court challenges to the "must carry" provisions of the 1992 Cable Act and the cross ownership prohibition of the 1984 Cable Act address the extent to which network owners may be information providers as well, and the extent of control such owners may exercise over access efforts by non-affiliated program providers and user/subscribers.

12 These activities take place electronically, easily, cheaply, on a vast scale, instantaneously and increasingly, globally. Indeed, the globalization of telecommunications infrastructure is extending this empowerment to greater numbers of individuals in a growing number of countries with sometimes unsettling political consequences. For instance, fax machines were used to keep now Russian President Boris Yeltsin in contact with the rest of the world when "hardliners" captured the nation's broadcast facilities during the 1991 soviet coup attempt. See, Remarks of Alfred C. Sikes, Chairman of the Federal Communications Commission before the Communications Week International's "The Networked Economy Conference," March 5, 1992, citing the February 8, 1992 issue of the Economist. See also, John Perry Barlow, "The Great Work; Philosophical Ramifications of World-Wide Computer Networks Electric Frontiers," *Communications of the ACM,* Vol. 35, January, 1992. See generally, Gladys D. Ganley, T*he Washington Quarterly,* Vol. 14, No. 2, p. 2, Spring 1991.

Direct dial telephone lines, computer bulletin boards, fax machines and computer networks were used by Chinese student dissidents in the China and the rest of the world to communicate during the ill-fated pro-democracy movement in 1989. Alternative networks of fax machines and computers were used in the 1988 Chilean plebiscite to guard against efforts by the "Pinochet" forces to compromise the vote. Fax machines and personal computers allowed Panamanian dissidents in the US, Switzerland, Spain, Great Britain and Latin American countries to communicate with the country when Noriega seized control of the independent broadcast and news media in 1987. See, Gladys D. Ganley, The Washington Quarterly, Vol. 14, No. 2, p. 2, Spring 1991.

The more overt political uses of telecommunications networks should not obscure the underlying fundamental uses. These networks can be used to "increase the number of individuals who can initiate electronic speech and the number of electronic fora available for assembly within or between countries. See, Allen S. Hammond, Regulating Broad-band Communications Networks, 9 *Yale J. on Reg.* 181, 190 (Winter 1992). The process of globalization is expected to continue as nations modernize their telecommunications infrastructures and the cost of transmission continues to drop. In the process, there is a growing potential for new

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Viewed together and in relation to one another, these trends will determine in significant measure the policies which establish the scope of electronic speech rights on the interactive, multi-media broad-band networks which are evolving from the antecedent technologies of broadcast, cable and telephony. These policies affect electronic speech on at least four levels. First, they establish the outer boundaries of what constitutes protected speech. Second, they significantly affect the physical network in terms of architecture, functionality and deployment. Consequently, they help establish the limits of what users may actually accomplish on the networks in terms of the manipulation, transport and communication of information. Third, they affect the ownership of the networks. Consequently, they set the preliminary scope of user rights based on the extent to which the government sanctions owner exercised control over network access and speech content based on technology.[13] Finally, because they set a significant portion of the networks' functionality as well as the ownership structure, they set many of the boundaries and criteria for subsequent judicial adjudication and apportionment of speech rights.[14] As a consequence, they go a significant way in establishing: what electronic speech will be protected; who shall have electronic speech rights; and, how such speech rights will be balanced against the rights of others.

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12 (...continued from preceding page)
aggregations of users and individuals to develop, often forming ephemeral communities of interest or, what one scholar has called "electronic neighborhoods." See, comments of Eli Noam in, Special Report: Universal Telephone Service; ready for the 21st Century? 1991 Annual Review of the Institute for Information Studies. A Joint Program of Northern Telecom and The Aspen Institute. Part 3; Edge: On & About AT&T Vol. 6, No. 175, December 2, 1991.

In the aggregate, these communities could combine to become the "global networked society." See, Pekka J. Tarjanne, Open Frameworks for telecommunications in the 1990s: Access to Networks and Markets, Telecommunications, Vol. 24, No. 4, p. 22, April 1990.

13 And other criteria as well.

14 Historically, much of the adjudication and subsequent apportionment of electronic speech rights has been based upon a technology's architecture and deployment as well as the manner in which it is owned. As a consequence, technical and market based decisions about network architecture, functionality and ownership may affect the scope of subsequently adjudicated network access and electronic speech rights which members of society will have.

Current efforts to limit indecent speech, as well as the probable outcomes of current litigation concerning access to cable and telephone networks could result in increased concentration of control over electronic speech at the network owner level. Such developments would conflict with efforts to render current and future networks more open and subject to user as opposed to owner control. Moreover, such developments would severely limit potential opportunities for expanded electronic speech, assembly and association by network user/subscribers.

To offset this potential result, the administration should establish policies which place the responsibility and civil as well as tort liability for electronic speech with the actual speaker while encouraging greater network user/subscriber access and control over the service creation elements of the networks to better assure the realization of electronic speech, assembly and association rights for network owners, information providers and user/subscribers. Such policies may be pursued and implemented consistent with First Amendment prohibitions on government regulation of protected speech and related association and assembly activities.

The administration must eschew its seemingly sole reliance on pro-competition policies to foster economic and technical access to networks and markets. Reliance on such policies alone will not adequately protect individual and group speech and related activities fostered by broad-band intelligent networks or existing telecommunications networks. In the process of managing market entry and firm competition, current U.S. competition policies run the risk of ceding creation and control of speech activities to private firms. This is particularly true to the extent the First Amendment is read as a negative bar to government action rather than an affirmative protection for speech activities.

Because these policies do not directly address the need for preserving and expanding electronic speech activities as a valid policy goal, there is a significant risk of losing opportunities for electronic speech and its related activities. Consequently the definition, preservation and expansion of electronic speech and its related activities must be elevated to a priority policy goal and incorporated within the broader policy framework of the government. A working group composed of members of NII's Telecommunications and Information Policy Groups may be the appropriate home for efforts to examine and establish the appropriate role

of electronic speech activities in emerging NII/telecommunications policy.

ECONOMIC/INDUSTRIAL POLICY

A. Infrastructure

The administration's strategy, inter alia, is to use telecommunications infrastructure to create high-skill, high-wage jobs, a cleaner environment and a public-private partnership to stimulate new businesses, create jobs and lure investments. Yet, in a significant portion of our urban and rural communities, the resident telecommunications physical plant is the oldest and least capable of providing access to many of the promised services and business opportunities. Under such circumstances, it is difficult to fathom how the development of the NII will affect such communities in a positive way. While the administration has offered assurances that one of the top priorities of the administration will be a quick modernization of networks in rural areas and in inner cities before the information network is finished, belated or untimely attention given to inner city and rural needs will assure only that the residents of such communities remain subsidized consumers of limited telecommunications services. Under such circumstances, the potential multiplier effect of telecommunications will be lost to such communities.

As one analyst was quoted as saying: "They're not linking fiber to satellites in Harlem. All of the announcements that have been made to date have been made in pretty lucrative areas where people have money ... [Companies know] that it makes the most sense to offer these services to a community that has robust demographics."

In developing the super-net, inner cities and rural areas should not be bypassed again the way they were when cable television was introduced nor should current failures to assure affordable access in telephony be compounded by the super-net.

B. Economic Opportunities

If the government, industry and academic prognosticators are right, and the technologies and information streams merge, it is estimated that the combined market for supernet supported services could reach 3.5 trillion dollars by 2001. The market would include television, telecommunications, computers, consumer electronics, publishing and information services. In such a market, with so much up for grabs, the risks are high, but, ultimately, the opportunities and rewards may be high as well. Someone will have to: manufacture and/or assemble the consumer electronics [converter boxes, flat screen displays, hand held remotes, micro-chips and micro-chip boards]; develop and/or produce the software [educational, video, print and computer]; provide and/or construct the access connection between residential users and the supernet; execute wiring construction subcontracts; acquire licenses for spectrum based technologies such as personal communications services; acquire the rights to programming and other information; create new databases; create and/or provide value added services; develop technology transfers in other countries looking to leapfrog more costly older established technologies; enhanced service provision design, install and manage local area networks; and resell multi-media telecommunications capacity. There is no good reason why firms situated in rural and urban communities could not create and provide many of these manufacturing and services businesses and concomitantly, new jobs.[15]

C. Jobs and Education

Residents of our inner city and rural communities across this country on average hold fewer jobs, and, the jobs held are on average less skilled and lower paying. Many of these jobs are disappearing and being

15 There is a necessary caveat to efforts at economic development in urban and rural areas. Development in one area should not be achieved at the expense of the other. For instance, efforts to move back-office jobs from big cities to small rural towns, makes one part of the country better off at the expense of another. A better strategy may be for companies to start up or expand to small rural towns and cities while serving a national or even international market. This tack appears more desirable because there is local ownership and, typically, there is net job creation instead of just shifting jobs from the urban to the rural areas.

"replaced" by service sector jobs which require a higher level of education than a significant portion of minority and female populations living in urban and rural areas have at present.[16]

Thus, the proposed goal of increasing the numbers of high-tech, high-paying jobs will not necessarily aid inner city and rural residents as such jobs require more education and higher skills than such groups have. In this respect, the Administration's proposal must incorporate answers to the potential negative effects of the NII, and seek to offset them with education, job training and the development of a viable strategy for long term economic development in urban and rural areas.[17] To accomplish this, the complex role and importance of telecommunications infrastructure to economic development in urban and rural areas must be ascertained, documented and incorporated into the government's initiatives to achieve universal service and economic self-sufficiency.

A Potential "Home" for the Proposed Economic Efforts

Based upon the established IITF structure, it appears such initiatives will fall under the Working Group on Universal Service (Telecommunications Policy Committee), and the Applications Committee. The Applications Committee in concert with the Telecommunications Policy

16 For instance in New York City, a significant portion of the African American urban population holds a major portion of the clerical "back office" jobs. These jobs are now being shipped out to overseas and rural locations. Hispanic Americans in New York City hold a significant portion of the low end manufacturing jobs. Not only is the absolute number of such jobs decreasing rapidly, but the absolute wages of the remaining jobs are shrinking.

Similarly, in rural communities farming and manufacturing jobs are decreasing rapidly. Yet, the service sector jobs that are being created in the finance, business, management and legal areas require more education than many inner city and rural residents have attained.

17 The Proposal identifies a number of initiatives already begun, which could potentially address this issue. For instance, the Emerging Telecommunications Technology Act should be implemented in such a way that significant support is given to efforts to use new technologies to create entrepreneurial and job opportunities in urban and rural areas. Efforts to rewire urban areas should, as in the case of Harlem, assure that lower income residents have access to the same services that upper income residents enjoy. Distance learning initiatives hold promise as a short term means of sharing scarce resources.

Committee should establish a Working Group on small business technology applications that could be used to stimulate economic activity and jobs in inner city and rural areas. This group would identify and assess the viability and replicable nature of various domestic and international efforts to use telecommunications technology for urban and rural economic development. It would solicit ideas for new ventures from the general public, private industry, entrepreneurs, federal and state agencies and the NII Advisory Committee. It would encourage inter alia, joint venturing between small, minority, female owned companies and established telecommunications companies to: 1) address areas of current market failure; 2) acquire new spectrum or other technology; and 3) stimulate bona fide economic development and jobs in economically depressed areas. The group would also identify available government programs and legislation (such as the tax law incentives for private investment in R&D, FCC minority ownership initiatives, and SBA programs) whose resources may be tapped to assist in fulfillment of its mission.

CONCLUSION

The proposals made above are certainly not exhaustive. Space limitations and time constraints preclude a more thorough treatment of the proposals as set forth at this time. However, it is hoped that there will be future opportunities to assist in the critical endeavor the administration has undertaken, and, that the proposals made above will be of some assistance.

Assembling the Pieces

Peter W. Huber[1]

The Information Infrastructure Task Force numbers among its primary goals the encouragement of private sector investment in telecom infrastructure.[2] The private sector has both the money and the technology to build a telecosmic highway. The challenge is to shape a regulatory and legal environment that will unleash private competition, and so impel private investors to advance the public good.

The recent spate of mergers in the telecommunications industry must be assessed in light of two market realities. The first is technological. From an engineering perspective, telephone and cable service are fast becoming one and the same. In the digital world, a byte is a byte—whether it represents a hiccup on a telephone call, or a decimal point in a spreadsheet, or one tiny fragment of a picture in a re-run of "I Love Lucy." Voice, video, and data are, or soon will be, indistinguishable. The same networks can and do carry everything. Telephone companies have at hand the capability to transport color television over their existing networks. Cable companies have at hand the technology needed to provide full, two-way telephone service over a combination of existing cable plant and wireless add-ons.

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1 PETER W. HUBER is a Senior Fellow of the Manhattan Institute for Policy Research and serves as Counsel to the Washington, D.C. law firm of Kellogg, Huber & Hansen. He is co-author of the treatise *Federal Telecommunications Law* (Little Brown 1992). He is also the author of *The Geodesic Network: 1987 Report on Competition in the Telephone Industry,* the report submitted to Judge Harold Greene on the occasion of the Justice Department's first triennial review of the Bell breakup.

2 Information Infrastructure Task Force, Executive Branch U.S. Government, *The National Information Infrastructure Agenda for Action,* B4, B6-B7 (Sept. 15, 1993) ("One of the most effective ways to promote investments in our nation's information infrastructure is to introduce or further expand competition in communications and information markets.").

Transport media are merging as well. Television used to travel by air, telephone by wire. Today, cable is the dominant medium for transporting television signals over the last mile to the home. Cable passes over 95 percent of American homes; over 60 percent actually subscribe. Meanwhile, the fastest growth in telephony is wireless. The FCC has cited studies projecting 60 million users of wireless services within the decade. Congress itself recently designated a very large block of spectrum (200 MHz) for allocation to new "personal communications services." Cable companies have been among the most aggressive and ambitious developers of these wireless services. The first PCS call in the U.S. to use cable plant for a portion of the transport was placed on February 12, 1992, from the President of Cox Enterprises to then-FCC Chairman Al Sikes.

The second basic determinant of market boundaries in the telecommunications industry is geographical. Consumers still buy "last mile" transport locally. A consumer in Denver buys service from cable and telephone companies in Denver, not Des Moines. This fact may seem obvious, but it is overlooked surprisingly often. From an antitrust perspective, however, it is critical. Local telecommunications, whether cable or telephone, are just that—*local*.

These two fundamental facts of the telecommunications industry suggest, in turn, two important conclusions for policy-makers concerned with maintaining competition in telecommunications markets.

First, phone companies and cable companies should be permitted to compete against each other head to head, in the same service areas. They are in the same business—or they will be as soon as regulators allow.[3] We should welcome the competition that engineering now makes both possible and inevitable. Maintaining regulatory walls between them will only suppress competition. At the same time, we don't want cable and telephone companies to combine competing facilities within the same

3 As noted by the Information Infrastructure Task Force, the national information infrastructure will integrate and interconnect components in a technologically neutral manner, so that no one industry is favored over any other. Information Infrastructure Task Force, Executive Branch U.S. Government, *The National Information Infrastructure Agenda for Action*, at B2. If this is to be the case, it is important that the rules that maintain competition among telecommunications carrier be technology-neutral as well.

geographic service areas. As Congress has recognized, a single provider of both cable and telephone service may be all that is economically possible in rural areas. But in big cities, cable and telephone companies should go at each other as independent entities.

The best way to encourage that is to permit *out of region* alliances —precisely the same alliances that should be forbidden within the same service areas. Such alliances present the most certain road to head-to-head competition among the seven Regional Bell Companies, GTE, Sprint, Time Warner, Cox, and other providers of both cable and telephone service, whose operations are currently confined to more limited geographic markets.

The potential benefits of such competition have already been tested overseas; British consumers have been the first beneficiaries. As *The Wall Street Journal* reported (October 21, 1993), a New York-based Regional Bell Company--NYNEX—is now battling for market share with British Telecom (BT), having entered the British market through a U.K. cable-television affiliate. NYNEX is preparing to offer British customers various discount-calling plans over its British cable network—including free night-time calls or special promotions for phoning friends and relatives. NYNEX's long-distance tariffs currently undercut BT's by as much as 13 percent. As the *Journal* reported, NYNEX "has emerged in the past two years as the biggest cable-TV operator in Britain and BT's most formidable rival for local telephone service." The *Journal* went on to note that cable-TV companies in Britain are already offering 226,871 telephone lines to British subscribers. By some estimates, cable-TV operators will capture as much as 20 percent of Britain's telephone market within a decade.

It now seems likely that U.S. consumers will soon realize similar benefits. What NYNEX is doing overseas, Southwestern Bell, US West, BellSouth, NYNEX itself, and most recently, Bell Atlantic, are preparing to do within the United States, outside their existing service areas.

Last February, Southwestern Bell announced its intention to purchase two existing cable systems. One is in Arlington County, Virginia and the other is in Montgomery County, Maryland. Both are in Bell Atlantic's telephone service area.

In May, US West invested $2.5 billion in Time Warner, the nation's second largest cable operator. Time Warner runs 13 of the nation's top

50 cable systems, including New York City (NYNEX), Orlando, FL (BellSouth), Houston, TX (Southwestern Bell), Honolulu, HI (GTE), Rochester, NY (NYNEX), Cincinnati, OH (Ameritech), Kansas City, MO (Southwestern Bell), Memphis, TN (BellSouth), Austin, TX (Southwestern Bell), San Diego, CA (PacTel), Charlotte and Raleigh/Durham, NC (BellSouth), and Malden, MA (NYNEX). Time Warner also operates a total of 30 cable networks in Bell Atlantic's region. US West/Time Warner is now in a much stronger position to compete against NYNEX, GTE, Ameritech, Bell Atlantic, and others than they were before that alliance was formed. There has been no offsetting loss to competition in US West's region; the company's alliance with Time Warner was structured to eliminate all possible horizontal aspects of the alliance within US West's home territory.

More recently still, NYNEX announced plans to invest $1.2 billion in Viacom International, the nation's thirteenth largest cable operator. One of Viacom's cable systems runs through the heart of San Francisco —PacTel's telephone territory. Viacom also serves Salem, OR (US West), Milwaukee, WI (Ameritech), and Nashville, TN (BellSouth). Here again, it is almost impossible to imagine how such an alliance could have any effect other than to increase head-to-head competition between NYNEX and the other Regional Bells. Within a few years, NYNEX/Viacom will almost certainly be offering phone service in direct competition with NYNEX's former siblings in the Bell family, just as NYNEX is already doing in Britain, through its alliances with cable entities there.

In October, BellSouth announced the acquisition of a 22.5 percent stake in Prime Management. Prime's Austin-based cable system subsidiary, Prime Cable, is the nation's 24th-largest cable operator. One of its systems operates in Las Vegas NV, side by side with a telephone network operated by PacTel. This surely means more competition, not less. Recent press reports also suggest that BellSouth may become a third bidder for Paramount.

And, in the largest deal of this kind, Bell Atlantic has announced its intention to merge with Telecommunications, Inc. (TCI). TCI is the nation's largest cable operator. Bell Atlantic plans to divest itself of any of TCI's cable properties within its telephone service areas; Bell Atlantic will use TCI's network to offer interactive cable-telephone service out-of-

region. Map 1 shows the geographic scope of all out-of-region telco-cableco alliances formed so far, as well as out-of-region alliances of telcos and broadcasters.

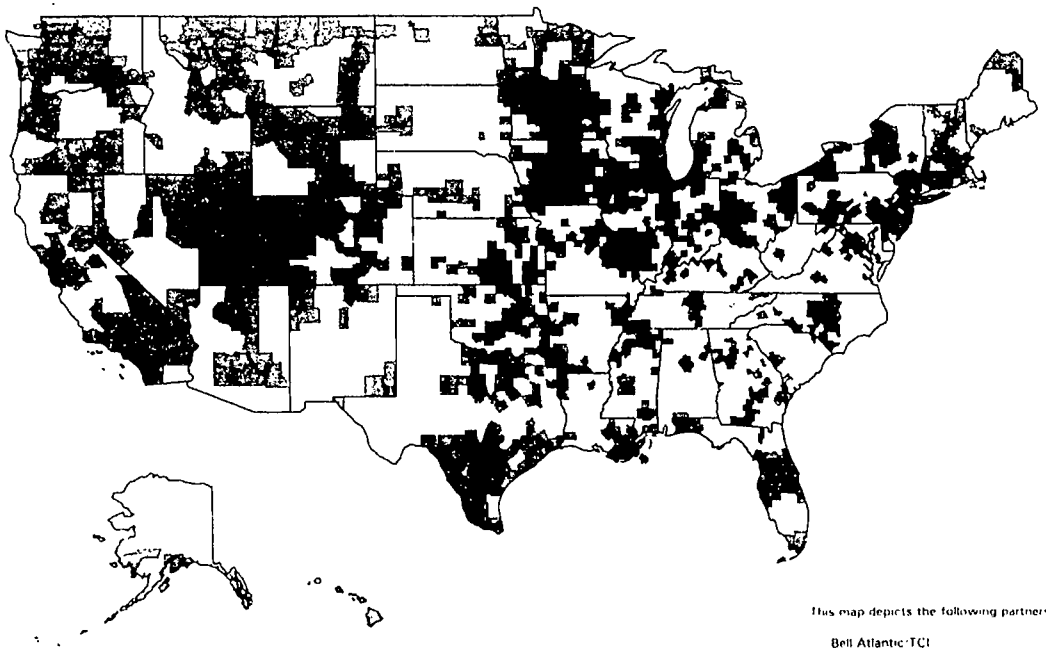
Competition is reaching outward in the other direction too—from the telephone network into the cable business. The FCC has led the way with its "video dialtone," which encourages telco provision of video transport in-region, and Bell Atlantic recently prevailed in federal district court on a first amendment challenge to a related provision of the 1984 Cable Act. Telephone companies have the technology to carry video over their existing networks; they are now being granted the legal authority to do so. Thus, as telcos prepare to offer cable services out of region, they must also prepare to square off against other telcos who will offer video dialtone on their home turf. Such developments should warm the hearts of antitrust enforcers and others who favor competition in telecommunications markets.

Defenders of the 1984 Cable Act have long argued that cable companies could *not* survive competition by telcos. No one would dare compete against a telco within its own service area, the argument ran. No cable company had the financial resources, the technical expertise, or the raw staying power, to do anything so risky. Thus, competition itself had to be forbidden, so that competition would be preserved. As recently as last Summer, for example, various groups were still arguing before a federal district judge that telco entry into the video programming business would quickly annihilate established cable carriers; all the customers would end up migrating onto telephone company facilities instead.

That prediction is not going to be vindicated. Backed by NYNEX, cable concerns in Britain have proved they can compete head to head against the massive British Telecom. Backed by out-of-region telcos in the United States, cable companies now have abundant resources and technical capabilities to compete against in-region telcos. American consumers will benefit. There is no sign that a trend towards vertical integration spells an end to competition; market boundaries are expanding faster than firms are consolidating.

The specter of some "Big Brother" monopoly developing in this kind of environment is highly implausible. GTE is the largest local telephone

Map 1. RBOC Out-of-Region Cable and Broadcast Affiliations



This map depicts the following partnerships:

Bell Atlantic-TCI
Southwestern Bell Hauser Communications
US West-Time Warner
BellSouth Prime Cable
Nynex-Viacom-Paramount

company in this country, followed by the seven Regional Bell Companies. Their counterparts in the cable industry—companies like TCI, Time Warner, Cox, and Viacom—are substantial entities too. As cable companies enter wireless telephony they will find themselves competing not only with local telcos but with AT&T/McCaw—a company with revenues over four times those of Bell Atlantic and TCI combined (for example). It seems wholly implausible to suggest that any other telco/cable alliance will knock AT&T/McCaw out of wireless telephony, or any competing telco/cable alliance out of video transport, either in the telephone company's or the cable company's service area. Monopoly is simply not a serious threat with this many well-matched players in the industry. The future is not Big Brotherhood but intense competition among a fractious, rivalrous brood of second cousin Hatfields and Dutch uncle McCoys.

Horizontal, cross-industry, cross-market alliances that unleash new competition will further many of the Task Force's goals. The Administration's February 22, 1993 policy statement notes that the development of technologies critical to the information infrastructure has been delayed because the returns are too distant or because the level of funding required is too great for individual firms to bear.[4] The Task Force proposes one answer to this problem, increasing federal funding of research and development.[5] Out-of-region alliances between telcos and cablecos will enable private industry to obtain the aggregations of capital needed to develop advanced networks.[6]

In 1911 a massive antitrust suit broke up the largest trust of that era —Standard Oil. Among the eight "Baby Oil" offspring were Standard Oil Of New York, Standard Oil of California, and Standard Oil of New Jersey, each initially confined to a single geographic region. Today, those companies are called Mobil, Chevron, and Exxon; their competing pumps are scattered across the nation. The breakup of Bell in 1984 began a similar process, in an industry that is being transformed by a far more fundamental technological revolution. Regulators and antitrust officials

4 Information Infrastructure Task Force, Executive Branch U.S. Government, *The National Information Infrastructure Agenda for Action*, at B8.

5 *Id.*

6 *Id.* at B4.

should keep a careful eye on things. But when former monopolists decide to invade each other's domains, the best government policy is to stand by and cheer.

Toward a National Telecommunications and Information Policy: A Development-Based Vision

Heather E. Hudson[1]

1. THE CHALLENGE OF CHANGE

The structure of the American economy is changing, with services now the most rapidly growing sector. Yet the shift to services is only part of the change. Information-based activities account for the largest part of the growth in services, and other sectors are becoming increasingly information intensive. Manufacturers must now be able to respond to changes in demand; suppliers must be able to produce small orders for quick delivery; merchants must be able to update inventory and accounts records instantly. As businesses ranging from Fortune 500 companies to family farms are drawn into the global economy, they must improve efficiency and react swiftly to changes in customer demand.

Education and medical services are also facing wrenching changes. In some states, faltering rural economies and migration from rural to urban areas have resulted in the closing of schools and reduced access to medical care. Yet population shifts are not the only challenge. Many states have legislated new curricula designed to raise educational

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1 HEATHER E. HUDSON is Director of the Telecommunications Management and Policy Program, and a professor at the University of San Francisco's McLaren School of Business. Dr. Hudson's professional experience includes telecommunications project planning and evaluation; and market research and policy analysis with emphasis on applications of new technologies, international policy, and the role of telecommunications in socioeconomic development. She has conducted studies of Alaska's rural telecommunications industry, engaged in communication satellite planning for Alaska and Iran, and conducted extensive fieldwork in the Arctic and Sub-arctic.

standards, but rural schools generally lack the funds to attract specialized teachers. Rural areas are also experiencing severe shortages of physicians. The result is that residents must travel long distances to regional health centers, and may go without treatment or preventive care until their condition becomes critical.

These problems are mirrored in inner cities, where access to quality education and health care is measured in economic rather than geographic terms. Inner city schools are also unable to attract teachers and funding necessary to offer the breadth and quality of instruction that students will need to be prepared for work with a future, rather than low paid, low skilled jobs. And lack of access to preventive health care services results not only in crowded emergency rooms, but higher medical and social costs of adults with severe health problems, children who have not been vaccinated, and infants whose mothers did not receive prenatal care.

2. THE IMPORTANCE OF INFORMATION

Of course, telecommunications and information technology cannot solve all of these problems. Yet they are vital components of any development strategy because universal access to information is critical to the development process. Telecommunications infrastructure provides a means of transmitting and sharing information, thus making the benefits of information widely accessible. Research on the role of telecommunications in socio-economic development has shown that instantaneous communication can help improve:

- *efficiency*, or the ratio of output to cost;
- *effectiveness*, or the quality of products and services; and
- *equity*, or the distribution of benefits throughout the society.

However, many other factors may influence whether and to what extent telecommunications may make an impact. Generally, certain levels of other basic infrastructure as well as organizational activity are required for the indirect benefits of telecommunications to be realized—that is, telecommunications may be seen as a *complement* in development —not a sole contributor. For example, a well managed organization such

as a manufacturing enterprise, a tourist development, or a health service will derive more benefits from telecommunications than a poorly managed or understaffed operation.

Telecommunications may also serve as a *catalyst* at certain stages of the development process, becoming particularly important when other innovations are introduced such as improved farming practices, lines of credit, or other incentives for decentralization and diversification of the economy. Examples include the tax incentives South Dakota used to lure Citibank's credit card operations from New York, the low wages and tax structures of some Midwest states that have fostered the growth of telemarketing services there, and pollution controls for Los Angeles that are likely to stimulate the growth of telecommuting.

3. THE NEED FOR VISION: A DEVELOPMENTAL APPROACH

Telecommunications can be used for a wide range of applications—in education, health care and social services, in small businesses, in agriculture, manufacturing, tourism and other economic activities. The operative word is *can*—whether these applications will be widely implemented may depend on the vision of policy makers.

To start with, we need a vision of the future that includes both social and economic goals for the nation's development, and recognizes that information—access, sharing, and dissemination—will contribute to achieving these goals. The next step is to ensure that Americans in every state have telecommunications facilities and services available to meet their information needs.

I believe that four fundamental criteria are critical in implementing this vision:

- *Accessibility:* We should strive to ensure that the widest range of telecommunications facilities and services is available throughout the country, and that all Americans have access to basic services.
- *Equity:* We need to ensure that there are not major disparities in availability and price of telecommunications technologies and services. That is, in addition to maintaining universal access to basic services (however they are to be defined), we need to make sure that

Americans are not penalized because of where they live or what companies offer services to them.

For example, information services need to be available in rural as well as metropolitan areas, in inner cities as well as suburbs. And rates for access to these services should not vary significantly throughout the country even if they are provided by different companies or using different technologies.

- *Connectivity:* In an era of new technologies and competing providers, we need to ensure that there is universal connectivity, so that Americans can communicate with each other and with information sources regardless of who provides their services or what technology links them to networks.
- *Flexibility:* We must recognize that changing technologies and the introduction of new services mean that we will have to be flexible in setting targets and adjusting to change.

4. THE GOVERNMENT'S ROLE

The *NII "Agenda for Action"* tends to downplay the importance of the government's role by stating that "carefully crafted government action can complement and enhance [these] private sector initiatives." Yet the government itself has a much more fundamental role: that of shaping and articulating a national vision.

This vital function was ignored during the 1980s, when what emanated from Washington was the litany of the marketplace: "The government should get out of the way. Let the marketplace decide." This laissez-faire approach may be a worthwhile strategy, but it is only a strategy—not a policy. Without a national policy—a coherent set of goals —we cannot judge whether market forces alone will get us there.

The act itself of setting these goals is necessarily a government role. Of course the government can, and should, seek opinions from many sources including the industry, private and public sector users, consumers, state agencies. But none of these constituencies is charged with setting a national policy.

5. NII GOALS

The *NII "Agenda for Action"* includes federal government proposals to facilitate extension and utilization of information infrastructure which are described as "goals or principles." Yet they are really initiatives designed to achieve unspecified goals. To place the NII within the national context and to rationalize the role of government in meeting them, we need to make these goals explicit—to articulate a national vision.[2]

We may identify four major national goals:

- to strengthen and diversify the economy;
- to provide universal access to quality health care and education;
- to ensure that all Americans have an opportunity to develop their talents;
- to protect the environment.

As noted above, there is substantial research and experience that indicates how information and telecommunications technologies can contribute to meeting these goals. Based on this evidence, we can identify the components of an information-based society necessary to achieve these goals. For example:

- citizens who are information seekers rather than passive consumers;
- industries that view information as key to their competitive strategy;
- public and nonprofit sectors that use information and communication technology to improve equitable access to their services;
- facilities for all of these constituencies to access and share information;
- innovative industries that can provide these facilities (networks and applications) for domestic use and export markets;
- policies designed to overcome barriers to opportunity such as distance, poverty and disability;

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2 Perhaps the best example of this approach was the study by Simon Nora and Alain Minc *[l'Informaticisation de la Societe]*, published in France in 1977, which set the agenda for the French government in information technology and telecommunications for the following decade.

- environmental protection strategies that include substitution of telecommunications for transportation and use of information technology in monitoring and managing natural resources.

Having set the goals, the government has three other important roles to play:

- setting ground rules, where necessary, which will facilitate achieving goals (initiatives concerning interoperability, security, the frequency spectrum and intellectual property rights are examples);
- implementing policies to achieve goals where the marketplace will not work (such as the initiatives on universal service, social service applications, and access to government information);
- monitoring progress: the *NII "Agenda"* does not set specific targets, nor does it address how progress toward implementing the NII will be monitored. This issue will be addressed below.

The remainder of this paper is not intended to comment on each of the *NII "Agenda"* proposals, but rather to raise issues that are either not addressed in the Task Force Report or need to be elaborated.

6. UNIVERSAL SERVICE: A MOVING TARGET

The accelerating introduction of new technologies and services, coupled with industry alliances, are evidence that policy makers must expect change to be the norm in telecommunications. Universal service must therefore be a moving target. Thus goals should not be stated in terms of a specific technology or service provider (such as optical fiber to the home provided by the local telephone company) but in terms of functions and capabilities (such as ability to transmit voice and data and possibly video in some cases; and ability to access information services).

The following are proposed as specific near term goals for universal service:

- **Universal Single Party Touchtone Service.** Telephone service should be universally available. Single party service should be required to facilitate facsimile and data communications. Switching

should become totally digital so that everyone has the option of using touchtone phones to access information services.

- **Service Quality Sufficient for Voice, Fax, and Data.** Line quality should be adequate for data transmission at up to 9600 bps. As noted above, party lines should also be eliminated.
- **Rates based on Community of Interest.** Where distances dictate that few calls are local, rate structures should take into consideration rural calling patterns so that rural residents are not unduly penalized.
- **Universal Enhanced 911 (Emergency Services).** All subscribers should have enhanced emergency service access (*i.e.*, 911 linked to a data base that displays location and possibly critical medical information about the caller).
- **Access to Optional Information Services.** All subscribers should be able to access optional information services such as remote data bases and electronic mail services through a local or toll free call to a gateway.
- **Mobile Services.** Mobile services also need to be universally available. (Mobile communications can be particularly important to people who spend much of their time on the land, or who travel long distances across the countryside.)

7. EQUITY ISSUES: BEYOND THE MARKETPLACE

One of government's roles is to intervene to ensure attainment of national goals where the marketplace will not work. Lack of telephone service across the U.S. is generally related more to income than to other factors such as isolation or ethnicity. Therefore, it appears that there will continue to be a need to subsidize services for some customers who are unable to afford connection to the network or basic monthly charges.

- **Targeted subsidies.** In a competitive era, rather than internal cross subsidies, we need to use targeted subsidies such as Lifeline (reduced monthly rates for low income subscribers) and Linkup (reduced installation charges). As the definition of universal changes (the "moving target") we may need to extend these models for targeted subsidies to cover basic access to information services.

- **Contributions from all providers.** All providers of interactive telecommunications services, including local exchange carriers, inter-exchange carriers, interactive cable telecommunications service providers and CAPs (competitive access providers) should be included in any scheme to fund targeted universal service subsidies.
- **High cost areas.** There are some isolated locations where the cost of installing telecommunications facilities is prohibitive to all but wealthy residents. Solutions may include subsidies to the carriers along the model of the industry-administered High Cost Fund, interest-free loans or extended payments schedules for subscribers. and/or incentives to carriers to use lower cost transmission links such as microwave, satellite or fixed cellular systems.

8. THE DANGER OF ELECTRONIC ISLANDS AND GHETTOS

The NII "Agenda's" goals of interoperability and openness will be critical to ensure that users are not left on "electronic islands" because their service provider is not interconnected with other networks. An analogy would be the early stages of commercial E-mail. Each commercial E-mail service was autonomous, so that communication between subscribers to different services was impossible or at least very cumbersome, although the Internet now links many of these E-mail islands.

Yet even if networks are connected, there is still a danger of creating electronic ghettos, low profit regions such as inner cities and rural areas, that carriers and service providers may have little incentive to serve or upgrade. There is already evidence of rural ghettos: rural areas served by the Bell Operating Companies and large independents have generally been the last to be upgraded to digital switching, and to have switches equipped with Signalling System 7 (SS7) and ISDN.[3] Ironically, customers of some rural telephone companies that have modernized are effectively isolated if the connecting carriers do not offer similar services.

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3 A rural nonprofit agency in one western state was told that it would be several years before SS7 was available from its local carrier. while a forestry company in an adjacent state was told there was not even a plan to make SS7 available in its region.

Pricing can also result in electronic ghettos, even where services are available. Fiber links will not bring promised benefits for health and education if health services and schools cannot afford to use them. Similarly, consumers in rural areas and inner cities will not benefit from communication and information services priced beyond their reach. The goal should therefore be universal access to a wide range of services at comparable (not necessarily identical) prices across the country.

9. INCENTIVES FOR SOCIAL SERVICE ACCESS

Some regions may have high quality telecommunications facilities that are being used by only one customer such as the state lottery, another government agency or major business. Regulatory policies need to facilitate experimentation and usage of surplus capacity. For example, carriers could be encouraged to propose innovative strategies for fostering educational and social service applications such as pilot projects and trials, use of off-peak, bulk rate, or other discount rates. Regulators, in turn, could provide waivers of existing rates for trial periods and for educational or other social services.

In other cases, regulators could create incentives that will allow market forces to work, for example, by facilitating aggregation of demand, so that many small users can obtain the services they need at affordable rates, or so that schools and health services can share facilities with commercial users.

10. THE TENSION BETWEEN FEDERAL AND STATE ROLES

The *NII "Agenda"* states that the government "will seek ways to improve coordination with state and local officials." Benign as it sounds, this may be one of the most critical—and most difficult—of the proposals.

The significance of the federal/state tension needs to be addressed more directly. There are three fundamental issues:

- the jurisdictional role of the states in regulating intrastate telecommunications can frustrate the achievement of any national telecommunications policies;

- state governments and regulators face limitations that make it difficult to propose or implement infrastructure policies;
- on the other hand, state and local governments are likely to be in tune with local needs, and many have been successful in developing state plans and fostering innovative initiatives.

Many state regulatory commissions face legislative restrictions which limit their ability to consider broad public interest issues such as socio-economic development implications of infrastructure upgrades, distance insensitive pricing, and waivers for educational applications. We might expect policy initiatives instead to emanate from state legislatures. Yet, as we found in *Electronic Byways,*[4] state legislatures have limited telecommunications expertise. Some 32 legislatures had no professional staff working on telecommunications; most of the rest had only one or two. California, with a population of more than 30 million, has two professional telecommunications staff members—one in the State Senate and one in the Assembly.

Yet despite these limitations, several states have prepared state telecommunications plans, introduced incentive-based regulation, and supported innovative projects using telecommunications for education, community services, and rural development.[5]

However, it is time to reconsider the jurisdictional issues. Telecommunications networks can no longer be considered as contained within state boundaries. The very notion of a network is that it links the user with everyone else connected to the network, even if that user chooses to communicate only with those within the local community or the state. And the trend toward video interactivity and the national goal of interoperability also mean that cable television is really no longer local. A case could now be made that all telecommunications services potentially involve interstate commerce, and therefore, whatever regulation may still be required should be at the federal level. (Canada

4 See Parker, Edwin B. and Heather E. Hudson, *Electronic Byways: State Policies for Rural Development through Telecommunications* (Boulder, CO: Westview, 1992).

5 Among these states are Colorado, Illinois, Indiana, Iowa, Maryland, Michigan, Minnesota, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Tennessee, and Wisconsin.

has passed legislation that makes all telecommunications regulation a federal responsibility, whereas formerly some telephone companies were provincially regulated. Cable television in Canada is federally regulated).

Whatever the resolution of jurisdictional issues may be, the states have an important role to play in extending information infrastructure and fostering its utilization. To implement national goals while at the same time being responsive to state and local needs, the federal government needs to get state and local regulators as well as executive and legislative levels of state governments to endorse and "buy into" national infrastructure goals. The NII initiative could adopt the Administration's health care reform model: *i.e.*, set national goals and let states determine how they get there. This approach might be considered a domestic version of harmonization (for example, as the term is used by the European Community): setting common goals to be achieved by all the states and local governments.

11. SMALL BUSINESS NEEDS

Although small business is a major contributor to economic growth, the *NII "Agenda"* does not appear to address small business needs. The telecommunications industry tends to focus on large commercial users and residential customers, while *NII "Agenda"* proposals attempt to fill the gaps by assisting nonprofit organizations and low income households.

First, small businesses are likely to need information about what the NII could mean to them. In a University of San Francisco project called "TeleFacts"[6], we found that small and minority businesses needed information about new telecommunications services, criteria for selecting equipment and choosing among competing services, and examples of how new services could benefit their businesses.

Pilot projects and demonstrations of small business applications could also be valuable, both to educate small businesses about applications of new technologies and services and to identify the needs of this market for the industry. Such businesses could range from small retailers and

6 The TeleFacts project was supported by the Telecommunications Education Trust, established by the California Public Utilities Commission.

services to cottage industries to family farms. The goal should be to encourage the telecommunications industry to offer services designed and priced for small businesses. For example, two-line Centrex now makes it possible for small businesses to have services previously available only to large Centrex customers or PBX owners. Affordable access to ISDN and/or switched 56 kbps service could also be beneficial for small businesses.

12. EDUCATION FOR USERS

Ongoing education will be required so that individual consumers, educators, health care providers, farmers, and small business proprietors can learn about the new telecommunications facilities and services available to them. They will need information on applications and benefits, on pricing of the services, on how to make choices among service options, and how to get assistance if they have problems with reliability, billing, privacy, or other problems.

The federal government should work with carriers, service providers, and consumer organizations to develop materials for schools and adult education classes, and for dissemination through professional and trade associations and publications.

13. MONITORING PROGRESS: AN NII REPORT CARD

Finally, the federal government will need to monitor progress toward reaching its NII goals. A set of performance indicators and measurements should be established, with data collected and published annually as an "NII Report Card." A list of proposed performance indicators is given in Appendix A.

It will also be important to evaluate the results of the NII pilot and demonstration projects. While it may be true that "the successes of these projects will create an iterative process that will generate more innovative approaches each year," we will need to learn what factors contribute to successful projects and what pitfalls should be avoided, and to disseminate the results so that both funders and project staff can benefit from the

project experience. Therefore, funding for independent evaluation should be built into each project.

14. HOW WILL WE ACHIEVE THE VISION?

It is likely that the marketplace will be the best mechanism for bringing innovative and affordable services to most Americans. However, we will need to monitor progress to determine whether there are disparities in access, quality of services, or pricing that need to be addressed.

We may also need to use innovative strategies to achieve the goals where the marketplace alone is insufficient—for example, incentives for upgrading of services in disadvantaged areas such as isolated rural areas and inner cities; incentives to encourage carriers to conduct pilot projects and offer attractive rates to education and social service users; and incentives to maintain service quality standards.

Telecommunications policy and socio-economic development in the past have seemed to be "two solitudes." However, the importance of access to information for economic development activities and social service delivery now point to the need to bridge the gap between these disciplines and responsibilities.

The above approach, which may be termed a "development-based approach to telecommunications policy" is based on the assumption that policy makers and regulators must consider the socio-economic implications of telecommunications policies. This approach assumes a broadening of the definition of "public interest" to include an analysis of the potential benefits of access to education and social services to citizens nationwide; the impact of geographical as well as income-related disparities; and the potential economic benefits of affordable access to information for both individual and commercial activities.

Many of the steps in implementing the vision will need to come from other entities: from the industry itself, other government agencies, users that can identify needs and develop strategies to aggregate demand and share costs. Yet policy makers must take a prominent role, both in the agenda-setting process and in devising strategies to achieve national information infrastructure goals.

We know what telecommunications and information technologies *can* do to help achieve national goals. Whether their full promise *will* be realized depends on our vision and our commitment.

APPENDIX A:

EXAMPLES OF NII PERFORMANCE MEASURES

The following are examples of performance measures that could be used to monitor progress toward NII goals:

- **Universal telephone service.** National percentage of households with telephone service; number and location of counties where more than 5 percent of households lack telephone service;
- **Single party service.** National percentage of households/businesses with single party service; number and location of counties where more than 5 percent of lines are multiparty;
- **Touchtone service.** National percentage of residential and business lines on which a touchtone phone could operate (choice of replacing rotary with touchtone service is left to the consumer); number of states where there is a surcharge for touchtone service;
- **Service quality.** National percentage of residential and business lines with quality sufficient for facsimile and 9600 bps data transmission without line conditioning;
- **Enhanced Emergency Service.** National percentage of exchanges with all lines served by 911 (emergency service); national percentage of exchanges with all lines served by E911 (enhanced emergency service);
- **Pricing.** National average price of selected services (such as basic monthly service, installation charge, intraLATA toll calls, selected information services); number and location of counties where price of these services deviates by more than 10 percent from these averages;
- **Equal Access.** National percentage of exchanges with equal access to competitive carriers on all lines;
- **Mobile Service.** Percentage of U.S. territory with access to cellular telephone service;
- **Information Gateway Access.** National percentage of exchanges with access to information gateways without toll charges;

- **Broad-band Services.** National percentage of exchanges with access to switched broad-band service;
- **Distance Education.** National percentage of school districts with access to video for distance education.

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The Promise of the NII: Universal Service is the Key

Mary Gardiner Jones[1]

The Administration's "Agenda For Action" provides a ringing endorsement of universal service for the NII. It envisages the NII as a national network of networks that will enable "all Americans to access information and communicate with each other, using voice, data, images or video at any time, anywhere" (p.5).

Principle Two of its nine principles and objectives to guide its NII initiatives sees the extension of the concept of universal service as a duty of government to ensure that information resources are available to all Americans at affordable prices (p.6).

But the Administration's NII vision fades when it comes to defining its action agenda. In introducing this agenda, the Administration places its major emphasis on promoting competition. It assumes without discussion that competition and universal service goals are essentially consistent and that "policies promoting greater competition in combination with targeted support for disadvantaged users or especially high cost or rural areas would advance both rapid infrastructure modernization and expanded Universal Service."

Yet the shortfalls of competition are not limited to disadvantaged consumers and high cost or rural areas. There is little evidence to date,

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1 MARY GARDINER JONES, attorney and consumer specialist, is the founder and President of the Consumer Interest Research Institute. She is also a co-founder and President of the Alliance for Public Technology, a nonprofit membership organization whose mission is to promote consumer access to new information technologies. She has served as a Commissioner of the Federal Trade Commission. She has also been a tenured professor at the University of Illinois and Vice President of Consumer Affairs at Western Union Telegraph Company. Ms. Jones has authored several papers on consumer and telecommunications issues and is the co-author of *21st Century Learning and Health Care in the Home: Creating a National Telecommunications Network.*

for example, that competition is driving the development of the NII to reach into any of the homes of residential consumers. If it is to do so, it will require the administration to be more realistic about:

- the role which competition can and cannot play in developing the NII for the benefit of all Americans;
- the full dimensions of the concept of universal service and the importance of articulating this concept statutorily as a goal of public policy which can guide the decisions of both competitors and regulators; and
- the options which are available to governments—federal, state and local—to promote universal service with the same urgency as competition.

Each of these principles will be elaborated below.

THE ROLE OF COMPETITION

There is no doubt that competition will be a powerful incentive for carriers to develop advanced networks to reach markets with high profit potential. We have already seen this with the entry of alternate competitive carriers such as Metropolitan Fiber Systems and Teleport into the telecommunications business markets. It could also be a significant incentive for the development of advanced consumer services once the deployment of these networks in residential areas is assured.

Metropolitan Fiber Systems and The Teleport Group have focused their competitive sights on building fiber rings around major cities and linking them to serve the video conferencing and high speed data transfer needs of large high volume businesses.

The telephone companies have responded to this competition for the most part, not by modernizing their public network, but by offering similar private dedicated line services and other high speed facilities to business companies within their service areas. Only two of the Bell companies have announced their intention to modernize their telephone networks to enable them to transmit broad-band communications to the home.

Interexchange carriers, like AT&T and MCI, are moving to bypass local telephone companies and compete for the voice business of residential consumers.

Finally, cable and telephone companies are gearing up to compete for the video-on-demand and home shopping residential markets. However, the networks to serve these residential markets require only a broad-band video pipe into the home and a narrow command data channel out of the home. These networks are not the two-way broad-band switched infrastructure which the "Agenda For Action" envisages will bring the benefits of the NII to serve the needs of all Americans. One cable company has announced a pilot project to wire up all residences in a city in Florida with two way broad-band capacity. Whether the recent spate of cable and telephone company mergers and joint ventures will enhance or impede cable-telco competition cannot be determined at this point. Clearly they will not enhance the competitive ability of small cable companies which, like many small telephone companies, can frequently be the source of innovative modernization programs. It may, as Bell Atlantic's chief executive officer, Raymond Smith, stated in an interview after the merger's announcement, force Bell Atlantic to rethink its cable competition strategies.

It is clear that the jury is still out on how far competition will move beyond these large business and residential voice, home shopping and video-on-demand markets and drive the growth and development of an advanced NII into the home of every American family.

Thus the Administration's assumption that the NII will be widely deployed to benefit all citizens through increased competition bolstered by targeted subsidies for disadvantaged consumers and high cost and rural areas has only a very tenuous basis on which to predicate long term public policy.

UNIVERSAL SERVICE

The concept of Universal Service is not a divisible concept. It has no worst or "best characteristics" (p.8). It is not solely a welfare concept or a concept of last resort.

Universal Service must be conceived of in broad comprehensive affirmative terms as a guiding principle to shape all future competitive and regulatory NII actions:

- to ensure the deployment of the NII to reach every American home;
- to define the basic set of essential services to which every American must have access in order to participate in the economic, social and political life of this nation; and
- to make certain that no American will be deprived of the benefits of these services by reason of income or disability.

Only when these three elements are present will the goals of universal service be satisfied and an individual consumer have realistic access to the NII and the services it can transmit. Life-line type subsidies will be of little value to consumers who do not have access to the advanced NII network. By the same token, access to the NII without access to essential and affordable basic services in the educational, health care and telecommuting arenas, which this advanced network alone is capable of transmitting, will be a vain gesture. It is just as serious to the NII goal of reaching all Americans if households within competitive areas are not served by the NII as it is if rural and small towns are not served regardless of whether they are high cost areas or not.

Clearly, the emphasis of universal service is on availability to the consumer not on whether competition may or may not exist or flourish in a given community. Targeting the concept of universal service, therefore, only to disadvantaged consumers and to high cost and rural areas is too narrow a view of universal service to serve the multimedia needs of all Americans.

There are some who argue that universal service goals can be satisfied if consumers have access to basic essential services in their communities rather than in their homes. This argument totally misapprehends the nature of services which the NII can make available to citizens.

A few examples in the three areas—health care, education, and telecommuting, singled out by the "Agenda For Action" as of special importance for citizens—will demonstrate this point.

Health care today has moved from the treatment of acute illness in hospital and out-patient facilities to preventative care, convalescence

from acute care episodes and the management of chronic illness—all of which take place in the home.

If the NII reached directly into the home to provide two way video communications, the remote delivery of health care monitoring and check up services as well as face to face visits between patients and their health care professionals could become commonplace. These electronic house calls would mean enormous savings in health care costs and in the time of health care professionals. Therapists could coach patients without having to come to their homes. Caregivers, physicians assistants and home care workers could be supervised remotely and receive essential advice and assistance again without the need for supervisors or physicians to make costly home visits.

Busy working parents, elderly homebound chronic patients and persons with disabilities for whom office visits to their physicians can become a major costly and time consuming experience, will reap enormous benefits from these home care electronically delivered services.

The critical point to understand about the importance of delivering these services to the home is that the bulk of the health care decisions which patients make about their health take place in the home.

It is in the home where citizens require access to the health care information and triage expert decision systems which they need.

Busy families are more likely to forego their search for important preventive and wellness information if they to have to search for it at their nearest public library or health clinic or at some kiosk in a busy shopping mall. If emergencies occur at night, their options are to dial their health professional on the box or go to the nearest emergency room at inconvenience to themselves and substantial expense for the clinic—especially if the visit turned out to have been unnecessary.

For chronic patients with difficulty in moving about, the challenge of getting transportation and the assistance of friends or family to get to their doctor's office or to the nearest health care center may result in foregoing their check-up with all of the attendant costs to which neglected health conditions will inevitably give rise.

Convalescing patients have no options to getting care at home—expensive as this is. Discharged from hospitals with portable pumps, central venous lines, ventilators and the like trailing behind them, they would travel to their health center or doctor's office at their peril.

The new multimedia educational services offer significant potential for altering in fundamental ways how we educate our students, train our workers and provide lifetime learning opportunities for adults. Research tells us that 55% of what is communicated between individuals comes from visual cues; 38% from intonation and only 7% is conveyed by text alone. Yet traditional education proceeds on the premise that learning takes place by pouring information—most exclusively text-based—into the heads of students and requiring them to disgorge it in similar formats.

The new multimedia telecommunications, computer and network technologies put students in the center of their own learning experiences. They enable learners to browse among a broad range of video, graphic, image and audio educational materials to select learning materials which respond to their unique interests, socio-economic and cultural backgrounds and learning styles. They allow students to create their own multimedia materials, alone or in conjunction with their schoolmates, instead of being confined to writing themes on assigned topics which can be such a chore to so many young students. Having access to these materials in their homes allows students to work collaboratively with their peers and also involves their families in their learning activities—both factors that educators know enhance motivation and learning effectiveness.

To confine access to these multimedia learning materials to school or public libraries ignores the budget realities which confront so many communities today whether they are in big cities, small towns or rural areas.

Many schools do not have libraries. None are open all year round. Most suffer from overcrowding and security problems. They have trouble accommodating their own students much less opening their doors to community residents seeking access to whatever telecommunications facilities they may have.

Public libraries experience the same difficulties. Many are being forced to cut back their evening and weekend hours when adult learners are most likely to need their services. Their staffs are overworked and few have telecommunications or computer expertise.

Indeed one of the major benefits of the NII is its ability to free students, both young and old, from dependence on their local community resources in order to access the multimedia learning materials they need. It creates a much more level playing field between affluent and less fortunate communities—but only if the NII reaches into the homes of all Americans.

Telecommuting is fast becoming America's new work paradigm. It is prodded by cities' concerns with pollution and traffic congestion and by workers themselves desiring more flexible work patterns to enable them to juggle their family and work responsibilities. As telecommuting matures, it will inevitably move beyond data input and data creation. It will require visual contacts among workers and between workers and their supervisors. Again, only the advanced NII will be able to accommodate these voice, data and video conferencing needs. Unless the NII reaches into the home of every family, the new technologies will have created another, and perhaps even more formidable, barrier to employment for American workers.

It is clear from these few examples that the concept of Universal Service cannot achieve the goals of the NII and bring essential benefits to citizens unless the NII is deployed directly to the home.

THE ROLE OF GOVERNMENT

The "Agenda For Action" lists several areas for government action to make the NII a reality. They include the promotion of private investment, the extension of the Universal Service concept, the enactment of communications reform legislation, tax initiatives and research. Yet nowhere is there recognition of the essential need to target each of these actions to ensure that the NII is in fact deployed to reach the homes of every American. Yet this is the area where competition is most likely to fall short and where the articulation and implementation of the goals of universal service will be most significant. Unless this last mile deploy-

ment of the NII[2] is assured by government action, the administration's vision of deploying the NII for the benefit of all Americans will remain just that—a vision.

To ensure that the vision becomes reality, the comprehensive reform legislation which the Administration contemplates must simultaneously enhance competition and promote the universal availability of the NII to every American. Such legislation should cover the following areas.

- Elimination of all barriers among telecommunications industry members to engage in whatever business they wish with appropriate attention to the application of the antitrust laws to protect consumers and business from monopolistic, unfair and predatory practices;
- Extension of the universal service goal in the 1934 Communications Act to telecommunications services as follows:

  > *make available, so far as possible, to all the people of the United States on an equitable basis, access to and from their homes to an advanced telecommunications network capable of providing efficient, affordable and usable two way switched voice, data, graphics and video telecommunications services.*

- Adoption of a regulatory system for all telecommunications providers which is technology and industry neutral and which is designed to ensure competitive flexibility and promote the goals of universal service as a network deployment concept as well as a concept to ensure consumer access to basic services at affordable prices and in usable formats.
- Establishment of basic NII consumer protection, to include network security and reliability, safeguards against privacy invasions, network usability for persons with disabilities and fair and adequate disclosures of the prices and terms of network services.
- Creation of a Communications Trust Fund (similar to the highway trust fund) to assist the deployment of the NII to reach the homes of residential consumers based on general revenues, special tax

2 The last mile network is defined here as that portion of the NII which links residential consumers to the nearest switch and which is open to all information and service providers.

assessments levied on all carriers alike and allocation of the revenues earned from the pending auction of spectrum.

- Authorization to states and local communities to take steps to ensure the deployment of the last mile of the NII in communities where, after five years from the enactment of this legislation, residential consumers do not have access to advanced networks and there are not carrier commitments to deploy open advanced NII networks to their homes.

  This five year period is predicated on the belief that citizens, access to health care, educational and other basic services must not be delayed indefinitely to see whether or not competition will or will not provide this access.

  Such steps may include one or all of the following:

  - construction of last mile networks which are two way, broad-band, switched, interoperable, interconnected and open to all information and service providers;
  - soliciting bids for the deployment and operation of these last mile networks from carriers, information providers, electric utilities, users, and other entities, individually or in consortiums;
  - providing financial incentives for such bids in the form of low interest loans, matching grants from state and federal communications trust funds and the like.
  - requiring bidders to provide residential consumers with two way video dial tone capacity and a package of basic services which will include free dial up capacity to access 911 services, make 800 number calls and make broad-band, wide band or narrow band collect calls[3].

  The ability to place collect calls as part of a "basic telecommunications services" package will enable state departments of education and school boards, libraries, state departments of health, community health centers and HMOs, businesses and other information providers

3 I am indebted to Charles Manto for the essential ideas underlying this suggestion. His proposal is described in Manto, "Universal Service: an Alternative, Alliance For Public Technology," Newsletter, Issue 16, June 1993, p.1.

wishing to do so to provide their services free of charge or at special rates to all or specially targeted consumers by enabling these consumer households to place collect calls when they want to receive these services.

- Authorization for applications research funds which will enhance the development of technologies and services to deploy last mile NII networks and to develop public services which are or are not likely to be developed by commercial information and service providers.

Comprehensive reform telecommunications legislation containing these provisions are essential to supplement the other actions listed in the Administration's "Agenda For Action." Together they would go a long way towards redressing the current imbalance in the "Agenda" between competition and universal service goals as the drivers of the NII. Such an expanded action agenda would offer realistic promise of promoting the development and growth of the NII, while at the same time ensuring that the NII will in fact serve all Americans equitably and within the foreseeable future.

Networks, Standards, and Intellectual Property: The Fabric of Information Infrastructure

Brian Kahin[1]

The Clinton/Gore Administration deserves credit for recognizing the convergence of technologies, industries, and issues in the emerging information infrastructure and for inaugurating a "virtual agency," the Information Infrastructure Task Force, to address the federal role in advancing the development of the infrastructure. The National Information Infrastructure initiative is ambitious but it reflects the scope and the broad economic and social impact of an integrated digital information environment. However, information infrastructure is more than the aggregate of linked lines, equipment, information, software, standards, and people. It is how digital information, networks, and the functionality embodied in software work together and how they interact with evolving policies and institutions in telecommunications, standards, and intellectual property.

It has been too easy to see the physical aspects of the infrastructure such as optical fiber and spectacles such as telephone and cable mergers, and so to see information infrastructure as simply an evolution of the existing telecommunications infrastructure. The telecommunications infrastructure is big, capital-intensive, and attention-grabbing. It reaches everywhere and is directly regulated by federal and state (and sometimes

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1 BRIAN KAHIN directs the Information Infrastructure Project in the Science, Technology and Public Policy Program at Harvard University's John F. Kennedy School of Government, where he also lectures on law, technology, and public policy. He is the editor of *Building Information Infrastructure* and the *Infrastructure Sourcebook*, and is currently co-editing *Public Access to the Internet* with James Keller. Dr. Kahin also serves as General Counsel for the Annapolis-based Interactive Multimedia Association and directs the Association's Intellectual Property Project.

local) governments. A mesh of veins and capillaries extending over the surface of the earth, it looks like traditional infrastructures.

But the widely used superhighway metaphor promises only bigger and better pipes. It misses two important aspects of information infrastructure: 1.) functionally enhanced access to knowledge, through software tools and systems for navigating among distributed information resources; and 2.) the transformation and integration (both within and across traditional institutional boundaries) of industrial, commercial, and managerial processes. These aspects of information infrastructure are actually higher level infrastructures, which I refer to as *knowledge infrastructure* and *integration infrastructure*. Within knowledge infrastructure there are sub-infrastructures for particular fields, disciplines, professions, technologies, etc. Similarly, within integration infrastructure there are emerging sub-infrastructures for different sectors, industries, and markets.

Knowledge infrastructure and integration infrastructure are so much a product of new digital technology that there are no convenient metaphors or models to advance public understanding and support. The networking aspects of knowledge infrastructure are evident in the NSF-funded part of the Internet and the push for the National Research and Education Network. But knowledge infrastructure is ultimately shaped less by networking than by aggregating, integrating, and manipulating information. Similarly, while networking is critical to coordinating processes within and across enterprises, the major challenges in developing integration infrastructure lie in optimal process design and the representation and management of processes using computers.

Federal funding for knowledge infrastructure, including the new digital libraries program, derives from the government's well-established role in providing support for basic research and, to a much lesser extent, its support for education. Federal investment in integration infrastructure has relatively recent roots: the CALS initiative in the Department of Defense (now aimed at using standards to integrate the defense and commercial technology base, as well as improving acquisition and management of new weapons systems), the National Initiative for Product Data Exchange (a joint industry-government effort housed at NIST), and elements of the multi-agency Advanced Manufacturing Program and Technology Reinvestment Project. Industrial extension services, such as

the new Manufacturing Outreach Centers funded by NIST, embody characteristics of both knowledge and integration infrastructure in that they are designed to provide useful information to small and medium-sized businesses, in large part to support process engineering, automation, and integration. (See Figure 1.)

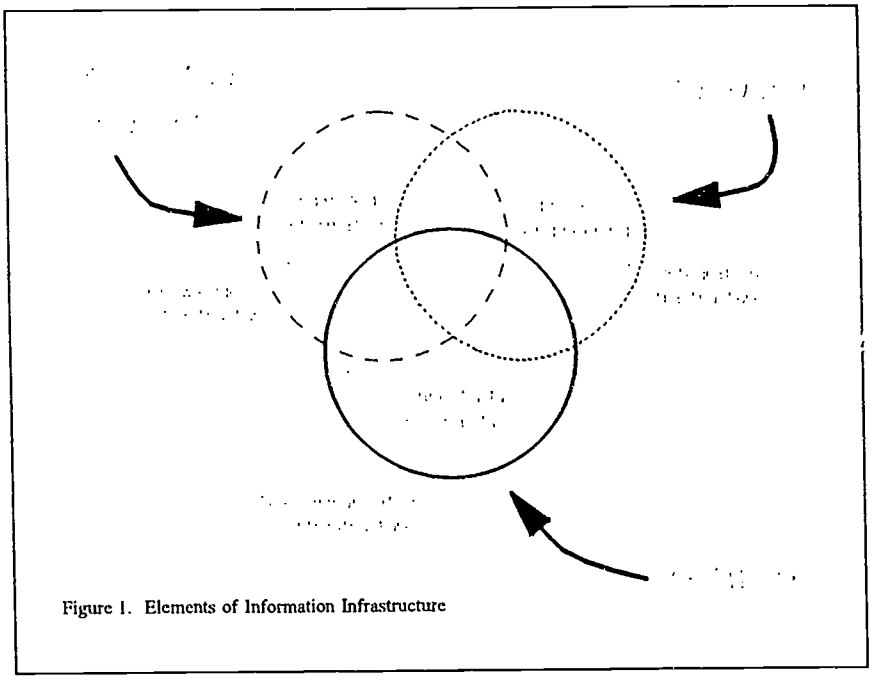

Figure 1. Elements of Information Infrastructure

The differences between these aspects of information infrastructure sometimes create confusion, especially because the roles played by the government have been so different. The government regulates the telecommunications infrastructure, whereas it has engaged in strategic investments in the higher level infrastructures. It is involved in procurement in all three areas. Many challenging uses of knowledge and integration infrastructure do not require high bandwidth, whereas many of the high-bandwidth uses expected to drive significant enhancement of the telecommunications infrastructure (additional video channels, video on demand, videoconferencing) have very limited implications for managing knowledge and complex processes. Nonetheless, consumer demand for entertainment may drive investments in low-level conduits

and so marginalize the networking costs of knowledge and integration infrastructure.

SHIFTING PARADIGMS: FROM THE NETWORK TO UBIQUITOUS NETWORKING

Behind the telecommunications, knowledge and integration aspects of information infrastructure are three paradigms: *networks*, *intellectual property*, and *standards*. These underlying paradigms are transforming and converging at the heart of the digital information infrastructure. (See Figure 1.) But each is branded and burdened by a separate and distinct past—in which AT&T was the network; the intellectual property landscape was defined by a conventionalized relationship between authors, publishers, libraries, and users; and standards were static and uninteresting embodiments of mature technologies.

The voice network is a homogeneous network of users, which is still a monopoly at the local level. The new network is the data network, a heterogeneous set of networks, public and private, supporting a variety of functions and services. In addition to users, data networks include hosts, computers which are individually addressable nodes of the network, as well as the addressable information that resides on the network. At the trailing edge, data networks become commodity-like: they can be assembled by users from personal computers, shrink-wrapped software, cables, and leased lines. They can be defined by software or by address lists; they can be instantly set up and torn down.

The explosion of local area and other private networks in the 1980s led to the growth of internetworking. Once the investment in computers and local area networks has been made, the incremental costs of interconnection are small. The bottom-up financing of the public Internet, in which the fixed costs of hardware, software, and leased lines are borne by end users, differs radically from the provider-capitalized voice network. Within the Internet, new investments are made on an ad hoc basis by those who benefit most directly. The level and functionality of network use continues to be driven by end-user investments in computers, storage, software, and training.

The close relationships between networks, computers, software, and human skills have powerful economic consequences. Specifically, the

positive externalities that help build networks (which become more valuable as more users connect) flow laterally to increase the value of, and the market for, computers, software, and related skills. This lateral flow of externalities among the elements of the digital infrastructure accelerates as the links and interfaces between these factors become standardized.

Public funding can play an early leveraging role in enabling applications and new user communities when the value of the network, application, or other resource is not widely understood and other information and transaction costs are high. This is the underlying rationale for the strategic investment components of the Administration's information infrastructure initiative. As new applications and networks grow, their value becomes clear, and market forces and mechanisms come into play.

The difficulty with strategic public investment in this environment is that technologies and markets are developing very quickly. Unless the government is able to manage and evaluate information effectively in advance of the field and the market, it risks skewing the market and inhibiting private investment. To a large extent, the NSF has succeeded in this regard with the help of peer review, although its continued investment in backbone services has elicited concerns about impact on private sector competition and investment.

The government's regulation of the voice network has been guided by the principle of "universal service." The principle is difficult to apply to data networking, because there are so many levels of speed and functionality depending on the end-user's equipment (local network, computer, peripherals, software), skills, and knowledge. Furthermore, technological change and the growth of resources available over the infrastructure create a quickly moving target at the low end as well as the high end.

The concept of universal service is extended in the *"Agenda for Action"* to include access to information, which is traditionally not a telecommunications policy issue but a library issue. However, public libraries are local institutions with little federal funding and no federal regulatory oversight. They are already profoundly challenged by an electronic environment which threatens to eliminate their collection

functions and puts them in the business of providing access to intellectual property, just like publishers.

INTELLECTUAL PROPERTY: FROM COPIES AND COPYRIGHTS TO CONTRACTS AND REGULATION

With the advent of digital information infrastructure, the model of information dissemination shifts from the manufacture and delivery of uniform products to providing access as a network service with varying degrees of functionality. Major cost elements of the traditional intermediaries, publishers and libraries, are radically diminished. Both find themselves in some degree of competition with newly empowered producers, on the one end, and newly empowered end-users, on the other, who can now often deal directly with each other. The effect of this disintermediation is to compel the traditional intermediaries to find new ways of adding value in order to maintain or enhance their strategic position.

In this environment, publishers are pushed to become content aggregators and content integrators. This includes linking their products and services with those of other publishers. There will be no dividing line between electronic publishers and digital libraries and many different forms of digital libraries, commercial and nonprofit. Ideally, these libraries will lead seamlessly into each other through gatewaying conventions as well as bilateral and multilateral arrangements, creating a richly functional, interoperating knowledge infrastructure.

Copyright, the paradigmatic regime in the print environment, adapts relatively well to the electronic equivalent of books and journals. Fair use, in particular, involves a calculus of economic impact which applies just as well in an electronic environment. But networks also allow copyright to be supplemented with a wealth of new legal and technological controls, which can mitigate the perceived risks of releasing proprietary information into the digital environment.

For high-value information, publishers are likely to rely increasingly on trade secret and contract protection, which can easily be invoked in a network environment by agreement with users. (This may also be important where copyright protection is limited such as exhaustive

compilations of factual information.) Libraries are concerned that publishers may be able to use contracts as a way of avoiding the fair use provisions of copyright, but traditional distinctions between published and unpublished information are no longer tenable. Copyright owners cannot be forced to publish and can therefore determine the degree of publication.

Whereas the thrust of telecommunications policy in the last decade has been the disaggregation and unbundling of a monolithic network, here the policy problem is quite the opposite: How to encourage aggregation of diverse types of content from different owners under licensing and technological controls that maintain accountability back to the individual components while keeping transaction costs under control. The task becomes all the more critical with the likely passage of the Copyright Reform Act of 1993 which increases incentives for content owners to litigate and so raises risks and costs for content integrators.

The difficulty of drawing lines in this environment has also been apparent in defining the outer limits of copyright: the line between expression, which is protectable, and idea, which is not. The value of interoperability, which is central to the development of infrastructure, is not established in the copyright law. Judges have given it varying weight —in some cases, none at all. The result is that end users, who seldom participate in copyright proceedings, may find themselves locked into products or systems that are more proprietary than they expected. However, users (at least large users) have become more sophisticated about the dangers of lock-in, and, to a large extent, the market has responded to the problem by offering technologies that are more or less "open."

The largest threat to the development of a competitive and affordable information infrastructure is the unchecked expansion of the patent system. This, too, is partially a consequence of the difficulty of drawing lines in an increasingly complex, dematerialized environment. Here, however, court decisions have decidedly increased the scope of the patent system and the leverage accorded to patents. The patent system has become very insular, with virtually no political or Supreme Court oversight since the specialized Court of Appeals for the Federal Circuit was established to regularize patent law in 1982.

The patent system is assuming a powerful regulatory presence in the higher levels of the developing infrastructure. The recently awarded Compton's multimedia patent, for example, purports to give a single provider an exclusive 17-year franchise on navigating among text and images using an index. (See sidebar.) Unlike most regulatory bodies, however, the USPTO does not develop policy through public rule-makings, and it conducts its adjudications in secret with only one interested party (the patent applicant). The Patent Office does not employ economists and normally has no interest in the economic impact of its operations; and it does not consider competing values (such as impact on information flows and First Amendment principles) in its decisions.

Claim 1 from U.S. Patent No. 5241671, "Multimedia search system using a plurality of entry path means which indicate interrelatedness of information":

We claim:

1. A computer search system for retrieving information, comprising:

- *means for storing interrelated textual information and graphical information;*
- *means for interrelating said textual and graphical information;*
- *a plurality of entry path means for searching said stored interrelated textual and graphical information, said entry path means comprising:*
  - *textual search entry path means for searching said textual information and for retrieving interrelated graphical information to said searched text;*
  - *graphics entry path means for searching said graphical information and for retrieving interrelated textual information to said searched graphical information;*
  - *selecting means for providing a menu of said plurality of entry path means for selection;*
  - *processing means for executing inquiries provided by a user in order to search said textual and graphical information through said selected entry path means;*
  - *indicating means for indicating a pathway that accesses information related in one of said entry path means to information accessible in another one of said entry path means;*
  - *accessing means for providing access to said related information in said another entry path means; and output means for receiving search results from said processing means and said related information from said accessing means and for providing said search results and received information to such user.*

Furthermore, decisions as to novelty and obviousness in areas such as business methods, educational methods, and software design are made by examiners trained in physical processes, typically electrical engineering. The predictable result is a large number of patents on known and obvious processes. Unfortunately, this leads too easily to the conclusion that reforming PTO operations is the answer. But could the PTO bureaucracy

really be reconstituted (and perhaps combined with the expertise and sophistication of ARPA and NSF) to give meaningful order to the rapidly evolving richness and complexity of the information infrastructure? The vision of centralized technology planning embodied in the patent system and the patent database seems fundamentally incompatible with the flow and use of information in a dynamic distributed environment where independent creation is commonplace, barriers to entry are low, and incentives to capital formation are not lacking.

Unlike copyright, where actual copying is necessary to show infringement, patents can be infringed inadvertently. This problem, which is especially severe given the 30-month processing time for many software-related patents, can play havoc with the development of industry standards since an unknown patent can pop up at any time. This problem would be alleviated by adopting pre-grant publication, which in most countries takes place 18 months after the filing date. This allows the public to submit examples of prior art and helps reduce the number of bad patents. However, 18 months is a long time in this field, and some have suggested that six months may better fit the pace of software innovation. Pregrant publication is inevitable if the U.S. moves to a first-to-file system, and along with the adoption of first-to-file priority, may well generate an avalanche of paper, but it would at least get the patenting process and the information costs inherent in the system out into public view.

Patents, as the Compton's multimedia patent demonstrates, have emerged as a potentially pervasive and powerful means of controlling access to information, a means both effected and legitimated through a federal regulatory system. They preempt basic functionality and cannot be designed around, and they are made inordinately powerful by the multidimensional leveraging (externalities) characteristic of the infrastructure. Thus the Compton's patent purports to block not only competing software developers but also the content providers that are Compton's historical competitors.

STANDARDS FOR PROCESSES AND STANDARDS PROCESSES

Standards are vital to information infrastructure because of the complexity of information systems and the need for extensibility, interoperability, and scalability over a range of functions. With information technology enabling and reshaping large segments of the economy—manufacturing, electronic commerce, health care— information standards are increasingly recognized as a kind of public platform. As such, standards provide context and market focus for further innovation and infrastructure development, reducing risks and transaction costs and instilling confidence in users.

At the same time, information infrastructure enables more efficient standards development. Electronic mail overcomes the geographic and cost barriers of conventional standards development by committee, allowing for participation by a wider community, including small companies, users, and academics. As in other networked enterprises, networked standards development has a leveling effect, so that contributions are more likely to be evaluated on merit rather than the affiliation or characteristics of the contributor. Networks also facilitate iterative standards development processes that enable trial implementations, which in turn provide feedback and help assure interoperability early on. The success of the TCP/IP (Internet) protocols relative to OSI is attributed to the fact that conceptualization and design proceeded in concert with implementation.

Standards development is assuming new strategic dimensions within industry. Alliances and consortia are formed to develop new platforms, generally to help develop both the technology and the market, but also as a response to the threat of market dominance by a single firm or another alliance. Requests for technology (RFTs) have been developed as a market-oriented means for the wholesale acquisition of adoption of common platforms. Some companies seek strategic advantage by making their technology more "open" than the competition, mindful that positioning and lead time may sometimes be more effective than conventional controls over intellectual property.

Many private-sector position papers on information infrastructure have stressed the importance of standards as a matter of public policy. On the

other hand, the private sector is wary of government involvement in standards development, since government agencies often lack a clear understanding and vision of the technological environment and government actions may prejudice the evolution of the technology and the market. But there are a variety of roles that the government can play. The FCC's HDTV proceeding is a well-known recent example of a regulatory role, but the government can also support standards development as research—as it currently supports work on product data exchange. More frequently, the government advances standards as a user. The different roles sometimes result in conflict: For example, while the research agencies played an important role in advancing TCP/IP protocols, agencies focused on procurement of conventional services favored the OSI suite.

Quite unlike networks and intellectual property, there is little academic or theoretical literature on standards development. This is changing as the evolution of information technology spins out a rich narrative of lessons in competition and cooperation, and as a few veteran practitioners and academic economists try to make sense of it. There are hundreds, probably thousands, of information technology standards efforts underway, all interrelated in a variety of ways. Each serves a different set of strategic interests. Each is more or less "open," more or less "public." The questions are increasingly complex, and interesting: Who controls it and how? What is the competition? Where is it going?

Standards are no longer merely invisible artifacts of mature industries. Standards have become platforms for enabling new markets and achieving competitive advantage, and the processes for enabling, designing, and implementing platforms are at the forefront of the expanding infrastructure.

INTO THE INFOCOSM: NETWORKS, STANDARDS, AND INTELLECTUAL PROPERTY

The three elemental paradigms are moving in much the same direction: from the monolithic network to ubiquitous, heterogeneous networks; from the invisible standard to visible standards processes and platform

battles; from the clearly defined roles of print publishing to a complex, multifaceted, and possibly treacherous intellectual property environment.

They are also converging. Information can be networked, as the higher-level Internet services demonstrate; the next step is information networking with accountability to content owners and integrators—i.e., mechanisms that support the networking of intellectual property.

Standards are essential to a fully competitive, interoperating telecommunications infrastructure. Open specifications help ensure that end-users are not locked in to the services of a particular conduit provider and that the elements of the infrastructure (including intellectual property) can be made available unbundled to maximize competition and opportunities for adding value and to efficiently serve as many uses and applications as possible.

At the same time, patents may thwart the development of standards and open platforms because patents in the pipeline (applied for but not granted) may be inadvertently incorporated. In other cases, patents may be broad enough to preempt functions that would otherwise be open to market competition and the development of public platforms. Just as content rides on conduit, content now also rides on functionality, which is controlled not by the local cable company but by patentees franchised by the federal government.

Having scoped out the dimensions of information infrastructure, the Administration needs to construct a policy framework. It must be coherent and powerful enough to assimilate and integrate diverse historically isolated issues that are now increasingly interrelated. Some of these issues have developed rich bodies of literature; some have an evolved sense of their own significance; some are captive to the ideology and rhetoric of their stakeholders. The Administration and the other proponents of information infrastructure must aim at the very heart of the matter. What are the essential characteristics of this infrastructure? How does it differ from other infrastructure? What are the justifications for different forms of government involvement? How should the values and policies associated with different elements of the infrastructure be reconciled or mediated?

This will not be easy because policy development for the three basic elements—networks, standards, and intellectual property— is dominated by different disciplines. In the case of networks, policy development is

guided by an extensive statistical base and a long history of economic analysis. In the case of intellectual property, policy development has been dominated by lawyers and legal discourse with very little economic analysis. (The unique nature of most intellectual property gives economists less opportunity for quantitative analysis.) The absence of analytic literature on standards means that standards policy development, such as it is, remains largely the province of those that actually develop the standards, such as engineers and, as users become more involved, MIS personnel. However, there is a recent and growing literature on the economics of standards which derives from network economics.

Indeed, from an economics perspective, standards occupy a central, perhaps pivotal, position in the infrastructure because they share fundamental characteristics of both networks and intellectual property. Standards exhibit classic network externalities in that they become more valuable as more people use them. Like intellectual property, standards are embodied in information, which is to a large extent a "public good" in an economic sense: it is nondepletable and it can be difficult to exclude people from using it. (See Table 1.)

We have implemented laws and systems for creating and protecting intellectual property to enable those who develop it to recoup their investment in the marketplace. Standards can be treated as intellectual property, but that tends to defeat their role as a public platform that focuses and enables markets. This function is especially critical within the digital infrastructure, where standards have unusually strong externalities that extend laterally and vertically as well as horizontally.

Standards for network interfaces, for example, not only expand the market for networks but increase the value of and demand for hardware, software, and information services. The free availability of standards in all stages of development is another factor that has contributed to the success of the Internet protocal suite and the growth of the Internet.

As a kind of platform, standards are conceptually linked to the common carriage principle of nondiscriminatory access and efforts to define universal service in terms of access to information or functional expectations. In fact, the analog voice network already provides a platform for fax, dial-up data communications, audiotex services, weather reports, tax information, etc. Government information in the

United States also serves as a kind public platform which anybody can build on, creating new intellectual property in the process.

	networks	standards	intellectual property
infrastructural perspective	telecommunications	integration	knowledge
dominant modality	communication	processing	information
paradigm shift	single network—> ubiquitous networks	fixed standards—> "open" standards processes	fixed roles—> complex environment
dominant policy discipline	economics	(engineering/ MIS)	law
economic characteristics	externalities from private goods	externalities from "open" public goods	proprietary treatment of public goods
policy development problems	stratification (multidimensional inequities)	lack of theoretical or empirical context	lack of economic analysis
govt. roles in infrastructure development	monitor prices; ensure interconnection; mitigate inequities	encourage public platforms	balance proprietary incentives and infrastructural externalities

Table 1. Elements of Information Infrastructure

CONCLUSION

We need a much clearer understanding of the incentives needed to generate intellectual property, the externalities at work within information infrastructure, and the political economics of platforms. Although we will never have the same empirical baseline that has framed the issues in telecommunications regulation, we need the same depth of economic insight. We also need a common discourse that spans established disciplines, industries, and jurisdictions.

The importance of networking, standards, and intellectual property is demonstrated by the roles assigned to the National Telecommunications and Information Administration, the National Institute of Standards and

Technology, and the U.S. Patent and Trademark Office on the Information Infrastructure Task Force. However, only NTIA has clear policy development credentials; NIST and the PTO have functioned primarily as service agencies. All are within the Department of Commerce, but Commerce has historically operated as a loose collection of fiefdoms.

This must change, and indeed, the Administration has made a clear commitment to vitalizing the Commerce Department and charging the Department with the implementation of a national technology policy. But much has to be done to enhance the ability of the three agencies to address the fabric of information infrastructure in a coordinated manner. Even within NTIA, the emphasis has been primarily on "telecommunications" at the physical level rather than "information." Perhaps the information component should be assigned to a new Intellectual Property Administration (IPA). The IPA would do policy research and analysis and oversee separate ministerial offices for patents, trademarks, and, Congress permitting, copyright. The virtual agency, the IITF, is a necessary step to policy development for the National Information Infrastructure, but it is not sufficient. Its agenda must inform, and ultimately reform, the underlying structures.

Building Open Platforms: Public Policy For The Information Age

Mitchell Kapor[1]

I. REALIZING THE DEMOCRATIC POTENTIAL OF INFORMATION INFRASTRUCTURE

The proponents of the National Information Infrastructure—from policymakers to public-policy groups to telecommunications executives—all agree about the ways the infrastructure is vital for the civic good. They cite its potential for connecting learners with learning resources, promoting vigorous political discourse, and increasing economic competitiveness. The corporations that are building the infrastructure suggest that by simply striking down existing regulatory barriers, investment incentives will produce an infrastructure built to serve all. Others suggest holding fast to traditional regulatory models and relying on antitrust law alone to promote the new infrastructure. Neither allowing rampant mergers nor mere opposition to market concentration will bring the benefits of the information age to the American public.

To achieve the democratic potential of the growing information superhighway we need a new social contract, updating the one cast in the 1934 Communications Act. We must organize a broad-based, public-private political coalition to revise the Communications Act according to the following principles:

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1 MITCHELL KAPOR is co-founder and Chairman of the Electronic Frontier Foundation, a nonprofit public interest organization established to develop and implement public policies to maximize openness, competitiveness, and civil liberty in emerging computer and communication networks. He is the founder of Lotus Development Corporation and designer of the "Lotus 1-2-3" application software program. Mr. Kapor served as president and CEO of Lotus from 1982 to 1986. He has served as chairman and director of the Commercial Internet Exchange (CIX) and as chairman of the Massachusetts Commission on Computer Technology Law.

- **Diversity of Information Sources.** Promote a fully interactive infrastructure in which the First Amendment flourishes, allowing the greatest possible diversity of view points;
- **Universal Service.** Ensure a minimum level of affordable information and communication service for all Americans;
- **Free Speech and Common Carriage.** Guarantee infrastructure access regardless of the content of the message that the user is sending;
- **Privacy.** Protect the security and privacy of all communications carried over the infrastructure, and safeguard the Fourth and Fifth Amendment rights of all who use the information infrastructure;
- **Development of Public Interest Applications and Services.** Ensure that public interest applications and services which are not produced by the commercial market are widely available and affordable.

EFF will work with a broad coalition that takes practical steps toward a Communications Act of 1994, that ensures equitable access to the information infrastructure for all.

None of the interactive services promised, or the diversity hoped for, will be possible with an eight-lane data superhighway rushing one-way into the home, and only a narrow footpath running out. Electronic media, from broadcast television to cable, have always been introduced to the public with great fanfare. But in spite of the promises of policymakers and media owners, they've ultimately disappointed us. The failures of regulation and the limits of the technology, itself, have prevented broadcast and cable television from becoming the promised saviors of education or political life. We must act now to ensure that the information highway is more than just 10,000 more channels of what we have today—what Newton Minow might have called "a vaster wasteland."

The clarion call to policymakers is to find a way to break the cycle of promise and disappointment that has marred the broadcast and cable media. Regulatory changes should be made, and mergers approved or barred based on specific, enforceable commitments that the electronic superhighways will meet public goals and realize the potential of digital technology. That potential arises from the extraordinary spaciousness of the broad-band information highway, contrasted with the scarcity of

broadcast spectrum and the limited number of cable channels that defined the mass media era. Properly constructed and administered, the information highway has enough capacity to permit passage not only for a band of channels controlled by the network operator, but also for a common carriage connection that is open to all who wish to speak, publish, and communicate on the digital information highway. For the first time, electronic media can have the diversity of information we associate only with the print media.

II. PUBLIC INTEREST COMMUNICATIONS POLICY GOALS FOR THE INFORMATION AGE: A JEFFERSONIAN VISION

The emerging information infrastructure will affect our civilization as deeply as did Gutenberg's printing press. Properly implemented, this new printing press can offer as yet unimagined opportunities for personal communications, for building and revitalizing communities, and for the development of vast markets for tomorrow's information entrepreneurs. Workers will benefit by being able to match their work demands to their lifestyle needs through telecommuting. The infrastructure can help business to work more efficiently, realizing global competitive advantage. And if the infrastructure is truly extended to all parts of the country, rural businesses can compete in markets previously closed to them.

To achieve these and other benefits, we know that we need more capacity than is currently available in today's analog voice telephone system. We also need more than merely 500 channels of one-way cable television. Today's telephone system does not have enough capacity to enable us to exchange the multimedia information sources that will be the staple of our information diet in the near future.

- **Beyond 500 Channels.** Five hundred channels can carry a lot of information, but they allow only a one-way distribution of information from the network operator down into each subscriber's home. The interactivity that is critical for educational services, for library access, for online medical assistance, for telecommuting or rural business connections and for the next generation of multimedia entertainment, cannot be accommodated in a closed, one-way system.

Our Jeffersonian vision of the information infrastructure takes the best features of both worlds: the high capacity of cable, plus the multi-directional capabilities of the switched telephone network. Only this kind of information infrastructure can give us this rich diversity of information sources and new applications accessible to all, with everyone able to contribute. Only this kind of infrastructure can truly create the range of new entrepreneurial opportunities that we've been promised. Only this kind of infrastructure will prove resistant to the monopolization of information distribution systems; its very design will promote the free flow of ideas.

A. Diversity of Information Sources: The Potential of a Switched Network

We stand at a critical moment in the history of the First Amendment and free expression. Aside from the universal service guarantee, the driving communications policy value for the last fifty years has been promotion of the maximum diversity of information sources, with the greatest variety of view points. As we move into the multimedia information age, we have a new opportunity to shape a communication policy that promotes diversity in ways not possible in earlier mass media such as broadcast and cable television.

Historically, the print medium has been the most successful at promoting a diversity of information sources. It is easy to become an information provider and easy to access information as a consumer (a reader). Compared to both the broadcast and cable television arenas, print is the vehicle for the greatest diversity of viewpoints and has the lowest publication and distribution costs. Despite the regulatory steps taken to promote diversity in the traditional mass media, the vexing problems of spectrum scarcity and limited channel capacity have always restricted the variety of opinion and information.

- **Switched, Interactive Networks—The Key To Information Diversity.** The switched nature of advanced digital network technology could end the spectrum and channel scarcity problem altogether. Broadcast and current cable media have a built in distribution bottleneck because of the limited number of channels and the hierarchical nature of the distribution system. An independ-

ent content producer must always negotiate with the channel owner for the ability to communicate with others. In a switched, digital network, the kind that phone companies and cable companies both speak of deploying in the near future, any user can communicate with any other user. The distribution bottleneck caused by having a small number of channel-holders is eliminated. Thus, anyone with content to distribute—whether to one, one hundred, or one hundred thousand users—can do so without the permission or advance approval of the carrier.

If new network services are deployed with adequate up-stream capacity, and allow peer-to-peer communication, then each user of the network can be both an information consumer and publisher. Network architecture which is truly peer-to-peer can help produce in digital media the kind of information diversity that exists today only in the print media.

In the long run, it will not be hundreds of channels or lines of video servers that promote diversity. It will be the ability of all participants in the national and international information infrastructure to be content producers as well as content consumers. Prior to digital network technology, the only way to bring more diversity was to build more channels or increase the regulatory control of video distribution networks. Today, because of the advent of high speed, switched digital services, content consumers could select from a nearly infinite array of programming available from various sites on the network. Content providers, by the same token, could make their information available to users all over the network. The Internet, with its non-hierarchical, peer-to-peer network architecture stands as a shining example of how to increase the diversity of information sources.

Numerous technology options exist to realize this goal cost-effectively and in the near term. In the telephone company networks, ISDN, ADSL, and HDSL are all able to provide interactive, two-way network access with carriage of medium to high quality video. In cable networks, several protocols have already been developed to provide very high-speed Internet access over the existing cable infrastructure. These same links could be used for

video and multimedia transport, in addition to the text-based services that now comprise much of the Internet environment.

- **Policy Priority: Deploy Open Platform Services.** To achieve the full potential of new digital media, we need to make available what we call Open Platform services, which reach all American homes, businesses, schools, libraries, and government institutions. Open Platform service will enable children at home to tie into their school library (or libraries all around the world) to do their homework. It will make it possible for a parent who makes a video of the local elementary school soccer game to share it with parents and students throughout the community. Open Platform will make it as easy to be an information provider as it is to be an information consumer.

  Open Platform services provide basic information access connections, ust as today's telephone line allows one to connect to an information service or the coaxial cable running into your home connects you to cable television programming. This is not a replacement for current online services such as America Online or Compuserve, but rather is the basic transport capacity that one needs to access the multimedia versions of these information services.

  Specifically, Open Platform service must meet the following criteria:

  - widely available, switched digital connections;
  - affordable prices;
  - open access to all without discrimination as the content of the message;
  - sufficient "up-stream" capacity to enable users to originate, as well as receive, good quality video, multimedia services.

Open Platform service itself will be provided by a variety of providers over interconnected networks, using a variety of wires, fiber optics, coax cable, and wireless transmission services. But however it is provided, if it is affordable and widely available, it will be the on-ramp for the nation's growing data superhighway.

- **Open Set-top Standards.** Today, the early adopters of the information infrastructure—those who use the Internet, Compuserve, America Online, Prodigy, and the over 50,000 computer bulletin board systems—rely on personal computers as their primary access

tool. Tomorrow, most who use the infrastructure will depend on a consumer "information appliance," which is likely to be an outgrowth of the current cable television set-top channel selection. Instead of just selecting channels, it will control access to a wealth of interactive services. So that those services can develop to meet a diversity of user needs, it is critical that these intelligent set top boxes (which are really multimedia computers) are designed according to open standards. As in the personal computer industry, open standards will lead to a flourishing of innovative applications. Closed standards, however, will give network operators the ability to stifle the development of new applications, to the detriment of consumers.

- **Caveat: The Information Highway Will Not Be Built By The Government.** The government cannot afford to build an entire national information infrastructure. Moreover, ignoring the investments already made by the communications industry would be a massive waste of resources. Most importantly, the prospect of a government-run communications infrastructure raises serious free speech concerns. The new electronic public forum will be the site of political, cultural, and personal discourse. Subjecting all electronic speech to government control would be antithetical to all of our political traditions. The recent U.S. Supreme Court "gag rule" case (Rust v. Sullivan) confirms that the government can use its resources to advance its own public policy ends. Just as federally-funded health care facilities can be used to limit access to and even knowledge of abortions, a federally funded information highway could be used to control political discourse. Though the First Amendment says that "Congress shall make no law... abridging the freedom of speech, or of the press," it may control expression in its own facilities.

The Administration and Congress can prompt the deployment of Open Platform services by using the political leverage at its disposal. Bell Atlantic, TCI, Time Warner, US West and others involved in recent mergers are all promising to build open platforms. Telecommunications giants are asking policymakers for permission to enter new markets or to form new, merged entities. Rather than per se opposition to current mergers, or mere reliance

on competition to build the data highways, make the mergers and other accommodations conditional on providing affordable open platform services. The terms of this new social contract should be written into a new Communications Act, revised for the information age. With a real "social contract" in hand, we just might realize the Jeffersonian potential of the data superhighways.

B. Universal Service: From Plain Old Telephone Service to Plain Old Digital Service

Just as Americans now depend on the telephone system for access to economic, political, educational, and social discourse, we will come to depend on the new information infrastructure to be fully enfranchised in our democracy and economy. To assure equal access to this new public forum, policies that currently guarantee universal telephone service must be updated. From the early history of the telephone network, both government and commercial actors have taken steps to ensure that access to basic voice telephone services is affordable and accessible to all segments of society. Since the divestiture of AT&T, many of the funding mechanisms that supported the "social contract" of universal service have fallen away. Re-creation of old patterns of subsidy may no longer be possible nor necessarily desirable, but serious thought must be given to sources of funds that will guarantee that users who are economically disadvantaged will still have access to basic communications services.

- **Policy Priority: Redefine Universal Service And Ensure Necessary Funding.** The universal service guarantee in the Communications Act of 1934 has, until now, been interpreted to mean access to "plain old telephone service" (POTS). In the Information Age, we must extend this guarantee to include "plain old digital service." Extending this guarantee means ensuring that new basic digital services are affordable and ubiquitously available. Equity and the democratic imperative also demand that these services meet the needs of people with disabilities, the elderly, and others with special needs. Failure to do so is sure to create a society of information "haves" and "have-nots."

  As the monopolies of local telephone companies are replaced by a more competitive telecommunications environment, the cost of

providing universal service must be shared fairly among all telecommunications providers. Interconnection and universal service obligations should apply to all entities that provide telecommunications service, regardless of the traditional industry category with which they are associated. So, a cable television company that provides voice or data telecommunications service, would have the same obligations as any other telecommunications provider, such as a local phone company or a wireless service provider. The scope of these obligations should certainly be proportionate to the companies' market presence, but otherwise, all who chose to provide telecommunications services should be subject to the same requirements.

C. Common Carriage: The Cornerstone Of Free Expression In The Information Age

In a society which relies more and more on electronic communications media as its primary conduit for expression, full support for First Amendment values requires extension of the common carrier non-discrimination principle to all of these new media. Common-carriage platforms will be critical as the new electronic public fora for politics, culture, and personal communications. They are the soap box, the local op-ed page, and the printing presses of the Information Age. If all carriers were to limit access to their networks based on the content of messages sent, the opportunity for free expression in society would be dramatically limited.

Re-shaping common carriage responsibilities for new media environments will be necessary as mass media and telecommunications services converge and recombine in new forms. Telephone companies, the traditional providers of common-carriage communications services, are moving closer and closer to providing video and other content-based services. By the same token, cable television companies, which have functioned as program providers, are showing great interest in offering telecommunications services. The desire of these industries to cross over into new businesses can be a source of great opportunity to consumers, if proper regulatory safeguards are put into place.

- **Policy Priority: Create A New Common Carriage Regime That Ensures Open Access To Interconnected Networks A d Enables**

Network Providers To Act As Programmers. Any carrier that is willing to offer Open Platform services on a non-discriminatory basis should be allowed to offer video programming as well. EFF believes that it will be possible to structure a regulatory regime in which infrastructure providers can provide both video programming, and common carrier-like telecommunications services on the same network. By allowing any infrastructure provider to co-exist in both regulatory categories, the provider will be encouraged to invest in both expanded entertainment services and, at the same time, make real contributions to the development of the national information infrastructure.

The information infrastructure will be built by a variety of network carriers, many of whom will be in direct competition with each other. Competition will benefit the consumer, but to ensure that the resulting network of networks has a truly national (and international) reach, carriers must agree to interconnect with competitors on reasonable terms. Open interconnection will help foster competition by enabling new carriers to enter the market, and will ensure that users of the infrastructure can reach all parts of the country.

A venerable regulatory tradition exists which argues that content and conduit providers must be separated in order to guard against anti-competitive behavior which could stifle, not enhance, diversity. Recent judicial action does cast some doubt on the constitutionality of such absolute cross-ownership bars. However, strong statutory safeguards are certainly required where content and conduit services are provided by a single network owner. We support safeguards in the tradition of antitrust law, that allow victims of discrimination to seek remedies directly from carriers.

The very existence of affordable Open Platform services will be the most important step toward promoting diversity of information in the new multimedia environment. Shaping the architecture of the new infrastructure in a way that promotes easy access for all programmers is the most important safeguard of all, if the goal is diversity and fair access.

D. Privacy

With dramatic increases in reliance on digital media for communications, the need for comprehensive protection of privacy in these media grows. The scope of the emerging digital communications revolution poses major new challenges for those concerned about protecting communications privacy.

Communication which is carried on paper through the mail system, or over the wire-based public telephone network is relatively secure from random intrusion by others. But the same communication carried, for example, over a cellular or other wireless communication system, is vulnerable to being intercepted by anyone who has very inexpensive, easy-to-obtain scanning technology. Cryptography—technology which allows encoding and decoding of messages—is an absolutely essential part of the solution to information security and privacy needs in the Information Age.

- **Policy Priority: Remove Restrictions On Use Of Strong Cryptography.** Without strong cryptography, no one will have the confidence to use networks to conduct business, to engage in commercial transactions electronically, or to transmit sensitive personal information. New technologies do pose new challenges to law enforcement and national security efforts. Government controls on encryption systems, however, whether for law enforcement or national security reasons, threaten to stall the development of the National Information Infrastructure and raise grave Constitutional issues.

III. CONCLUSION—THE ADVOCACY AGENDA

Together with a coalition of public interest groups and private industry, the Electronic Frontier Foundation is working to establish Open Platform objectives in concrete legislation. Open Platform provisions, which would cause near-term deployment of Open Platform services, are present in both the recent Senate infrastructure bill and the latest draft of House telecommunications legislation. We are also working with the Administration to have Open Platform policies included in the recommendations of the Information Infrastructure Task Force. In addition to

federal policy, critical decisions about the shape of the information infrastructure will be made at state and local levels. Since 1991, EFF has been working with a number of state legislatures and public utility commissions to have affordable, digital services provided at a local level. As cable and telephone infrastructures converge, we will also work with local cable television franchising authorities. We invite all who are concerned about these issues to join with us in these public policy efforts.

Public Libraries, The Public Interest, and The National Information Infrastructure (NII): Expanding the Policy Agenda

Charles R. McClure[1]

The development of the National Information Infrastructure (NII), and the Clinton Administration's support for this effort offer the promise of a communications revolution that will affect the very fabric of our society. *The National Information Infrastructure: An Agenda for Action* (Information Infrastructure Task Force, September, 1993) [hereafter referred to as the "Agenda"], outlines a view for what the NII might become and describes the Administration's view of principles and objectives that will direct this effort.

The "Agenda" is an important effort on the part of the Administration and the Information Infrastructure Task Force (IITF), and has served an important role in stimulating additional debate about what the NII is, how it can be developed, and its potential impact on society. As a policy statement, however, it raises more issues than it resolves. Thus, in the spirit of continuing the debate, this paper identifies and discusses a number of key issue areas related to the public purposes of the NII that have received inadequate attention in the *"Agenda."*

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1 CHARLES R. McCLURE is a Professor at Syracuse University's School of Information Studies. He was selected to serve as the Fall 1993 Distinguished Researcher for the National Commission on Libraries and Information Science. He teaches courses in U.S. government information management and policies, information resources management, library/information center management and planning/evaluation of information services. He is editor of the quarterly journal *Internet Research*. His most recent book is *Libraries and the Internet/NREN: Issues, Perspectives, and Opportunities*.

At the outset, it should be recognized that this paper will only examine a small, although important portion, of the overall topics and issues raised by the *"Agenda."* More specifically, this paper argues that the Administration has inadequately addressed issues related to:

- Promoting the roles of libraries, and particularly public libraries, in serving as a safety net for access to networked information, as a mechanism to promote network literacy, and as a means to encourage universal access to the NII.
- Developing ongoing program evaluation and policy assessments to identify impacts from the NII and to assess the degree to which the NII promotes national societal values and goals.

In short, the paper argues that cultural, educational, and societal values should drive the development of the NII as opposed to economic imperatives. While we can all agree that those economic concerns certainly are important for the Nation's development, societal values and goals must be agreed upon first, to form the basis of NII development.

SOCIETAL GOALS AND PRINCIPLES

Other organizations have proposed goals and principles that should be considered in the development of the NII. An excellent example of such a statement is that offered in *Serving the Community: A Public Interest Vision of the National Information Infrastructure* (Computer Professionals for Social Responsibility [CPSR], 1993, pp. 11-12). Goals listed there requiring specific attention and additional policy development in the *"Agenda"* include:

- **Universal access.** Everyone in the country must have a place they can go to gain access to the NII, simple training in the effective use of these tools must be available (p. 11).
- **Vital civic center.** Schools and libraries play key roles in nurturing the civic sector. Not only should people be able to reach out into the NII from schools and libraries, but people should be able to reach into them from the NII (p. 13).

- **Privacy.** The protection of privacy is all the more important in advanced communications networks where enormous amounts of personal information are generated and transferred (p. 14).
- **Guarantee equitable and universal access.** Universal access to the NII is required to ensure that society does not become divided into the information poor and the information rich.... To limit people's access because they are physical disabled, economically disadvantaged, or geographically remote is unacceptable in a democracy (p. 16).
- **Provide access to government services and information over the NII.** Individuals need access to social services, public information, legal records, census and agricultural data; the ability to inspect and correct government records about themselves; and information on pending public policy decisions and the ability to comment on them (pp. 16-17).

Other goals listed in the CPSR statement are also important, but the above five combine to suggest a policy area that has yet to receive adequate attention by the IITF.

Within this policy area that broadly addresses the public purposes of the NII, related goals can be proposed:

- **The public library will serve as a safety net to insure public access to and use of the NII.** Unless formal policy and dedicated resources are provided to an institution such as the public library, a large number of disadvantaged individuals will fail to realize the benefits of the NII. The public library has traditional roles and responsibilities in this area and can move into the NII with adequate support and policy development.
- **The government will support the goal of promoting networking literacy and basic training in the use of the NII.** Once again, it is essential that individuals in this country have the opportunity to learn how to access, use, and integrate the benefits of the NII into their daily and work lives; the education and library community are well able to accomplish this goal.
- **Ongoing evaluation and assessment of the costs, benefits, limitations, and impacts of the NII on society will be supported.** Currently, there has been virtually no evaluation on the impacts of

> the networked environment on society and individuals. If policy is to be refined and developed, we must better identify and evaluate those impacts as a basis for future policy development.

Clearly, there are numerous additional policy areas which can be addressed. But for purposes of this paper, the above three policy goals are emphasized. Together they address issues of universal access and concerns about how the NII will, in fact, affect our society. Equally important, they are intended to draw the IITF's attention to social and behavioral impacts from the NII and to encourage the development of the NII in such a way so it benefits a range of public purposes.

IMPORTANCE OF H.R. 1757

H.R. 1757, the *National Information Infrastructure Act of 1993* passed the House in Summer of 1993. Section 2 (5) states:

> The Federal Government should ensure that the applications achieved through research and development efforts such as the High-Performance Computing Program directly benefit *all Americans* [author's emphasis].

And Section 305 (b) states that the program will:

> Train teachers, students, librarians, and state and local government personnel in the use of computer networks and the Internet. Training programs for librarians shall be designed to provide skills and training materials needed by librarians to instruct the public in the use of hardware and software for accessing and using computer networks and the Internet.

This bill is important since it includes language supporting universal service, extending the role of libraries and the education community in developing and operating the national network, and promoting the development of networking applications and demonstration projects. The bill recognizes the importance of assisting the public move into the networked society successfully.

As of December 1993, the bill had passed the House and was stalled in the Senate. The Administration and the IITF need to support H.R.

1757, support its movement through the Senate, and embrace the goals and language it currently contains. If changes are to be made in the bill, they should promote the government's support for a range of public purposes to be accomplished by the NII—such as direct support for the public library to serve as a safety net in the NII environment.

THE ROLE OF THE PUBLIC LIBRARY

Despite the traditional role of libraries in providing a range of information resources and services to the public, there has been inadequate Federal policy and planning to assist libraries in the transition to the networked environment (McClure, Moen, and Ryan, 1994). Nor has there been adequate planning or assistance to the public in learning how to use and access these electronic resources. Making these resources available to the public, learning how to communicate and use the network, and insuring network literacy among the population is critical to the success of the NII and to the people in the networked society.

A national survey of public libraries and their use of the Internet is being completed by the National Commission on Libraries and Information Science (NCLIS) (see Appendix A). The survey will provide descriptive data about public libraries' connectivity to the Internet, the services they provide, barriers being encountered, and how best these barriers can be minimized to support public libraries' movement into the networked environment. The study is planned to be completed in Spring 1994 and will result in a range of policy recommendations that will be forwarded to the IITF and other policy making bodies (National Commission on Libraries and Information Science, 1993).

One vision of education in the networked society is to have public libraries all connected to the national network. Any person could access the array of information resources and services simply by using the "network room" in the library. Students could work interactively on lessons, adult learners could tap into endless instructional tools and persons providing support to use those tools. Virtual learning communities can form and grow. Regardless of one's personal situation, access to and knowledge about the Internet could be obtained from the local public library.

Electronic resources or all types and forms would be publicly available for those who cannot connect from the home. Librarians and educators would serve as electronic intermediaries, navigators, and instructors—being actively involved in assisting people to best use the network. Parents, students, adult learners, educators and others could work interactively and inter-dependently on projects and activities that we can only begin to imagine now. The public library, as a non-partisan, publicly supported institution, with strong local community ties, is well-suited to serve in this role.

This, of course, is just one of many possible visions. Minimally, the key stakeholder groups that need to participate in such a discussion are information providers from the commercial and public sectors, government policy makers, educators, librarians, parents, and individuals and firms that design instructional materials and equipment. Constructive policy debate among these groups (and possible others) in terms of insuring public access to the NII has not occurred. Discussions about how the network should evolve, how people should be able to use the network, and how individuals will be empowered by using the network (as opposed to entertained) are essential. Such debates are at least as important as the profit potential of the NII and how the NII can serve as an economic pump for the Nation.

Debate also needs to center on the role of the public library as a "safety net" to insure public access to the NII. The notion of a safety net is that any person would be provided with the opportunity to obtain physical access to the NII and to be provided with basic training and support in how to use the NII. Private sector firms cannot expect to sell products to the population unless they know how to use the NII and have access to it. The Federal government cannot expect people to use service kiosks to access a range of government services without physical access and support (Office of Technology Assessment, 1993a). The public library can, with clear Federal policy mandates and adequate support, fulfill this safety net role.

NETWORK LITERACY

Re-casting information literacy notions into the networked society are mind boggling. Recent studies by the Office of Technology Assessment (1993b) and the Department of Education (1993) estimate that as many as 90 million adults—about 47 percent of the U.S. population—demonstrate low levels of literacy. Other findings from these two studies are equally distressing. It must be remembered that these findings consider literacy in a print-based society and not in a networked society.

At one level, an individual must be able to read and write— traditional notions of literacy. At another level, the person must be technically literate, e.g., be able to operate computer, telecommunications, and related information technologies. At a third level, people need media literacy—the ability to use a range of information media, e.g., CD-ROM, and yet at another level, they need network literacy. All of these types of literacies can be cast in the context of information problem solving skills (Eisenberg and Berkowitz, 1990).

A beginning discussion piece for the knowledge and skills that might comprise network literacy for the general public include:

Knowledge

- Awareness of the range and uses of global networked information resources and services
- Understanding of the role and uses of networked information in problem solving and in performing basic life activities
- Understanding of the system by which networked information is generated, managed, and made available.

Skills

- Retrieve specific types of information from the network using a range of information discovery tools
- Manipulate networked information by combining it with other resources, enhancing it, or otherwise increasing the value of the information for particular situations

- Use networked information to analyze and resolve both work- and personal-related decisions and obtain services that will enhance their overall quality of life.

Such knowledge and skills cannot be seen as "supplemental" to traditional literacy, but rather, as part of a reconceptualized notion of literacy in an electronic society.

These skills and knowledge are targeted at the general public for network literacy. Likely as not, they will require other "literacies" to already be in place. Additional knowledge and skills certainly can be included in this beginning list. But even these knowledges and skills listed above, while seemingly basic and rudimentary to the already network literate, will require national commitment and a range of programs if they are to become commonplace in society.

Answers to what constitutes network literacy and how network literacy relates to other types of "literacies" requires immediate attention and research. But as more information services and resources are networked, those individuals who, for whatever reason, cannot access and use them will be severely disadvantaged in society. They may be unable to obtain good jobs; they may not be able to communicate effectively with governmental units; they may not be able to exploit a range of self-help or entertainment services available over the network; and they may become disenfranchised from mainstream societal goals and values.

Implications from such a widening gulf between the network literate and the illiterate are significant and require immediate Federal policy review and attention (McClure, 1993). The IITF should consider how best to empower the public to be able to use the NII effectively, who or what would have responsibility for promoting network literacy, and assessing the role of the Department of Education in this policy area.

EVALUATING IMPACTS FROM THE NII

It is important to differentiate the notion of user-based evaluation of networked information services from a systems or technology perspective of evaluation. The systems perspective might consider total number of packets transported over the network, the number of log-ins to a

particular server, or the accuracy with which a particular router moves messages from one system to another.

While such assessments are useful, they do not address the degree to which users of the service have their particular needs met, the impact that use of the service may have made on the user, or the ease of access encountered in using a particular service. Systems or technology-based criteria for a "successful" networked information service do not insure successful use of the service from a user's point-of-view.

Approaches for evaluating networked information services can be based on the following criteria:

- **Extensiveness.** how much of the service has been provided, e.g., number of users logging-in per week on a bulletin board, or the number of participants of a particular list-serv
- **Efficiency.** the use of resources in providing or accessing networked information services, e.g., cost per session in providing access to remote users of an online catalog, or average time required to successfully telnet to a remote database
- **Effectiveness.** how well the networked information service met the objectives of the provider or of the user, e.g., success rate of identifying and accessing the information needed by the user
- **Impact.** how a service made a difference in some other activity or situation, e.g., the degree to which faculty network users (for example) increased their research productivity or teaching effectiveness by use of networked information services.

Although evaluations of networked information services need to consider extensiveness and efficiency criteria, much more attention needs to be given to effectiveness and impact measures.

Because networked information services are multi-dimensional, the type of evaluation needed will be multi-dimensional and longitudinal as well. A single measure provides only one "snapshot" of a particular service; multiple "snapshots" of measures are needed. Moreover, evaluators of networked information services will need to know what type of evaluation approach and data collection techniques will be appropriate for what types of services (see McClure, 1994 for examples of techniques). The key point is that we need to develop evaluation

strategies that are user-based, that is, they examine networked information services from the point-of-view of the user.

Providers of networked information services must not accept as a "given" that their services, resources, and technical procedures are effective and meet broad public purposes; rather, they must test their assumptions about the quality of networked information services through an ongoing process of evaluation. Ongoing evaluation activities are essential to support the provider's planning process. Planning and evaluation are two sides of the same coin. Each will be more successful when the other is part of the overall services design and implementation approach.

If the NII is to be successful, it must be integrated into the working lives of users in those communities they are meant to serve. Such integration depends upon identifying and addressing a number of social and behavioral issues related to the use of networks by the various users. A user-based evaluation perspective considers issues such as:

- How can the use of electronic networks facilitate the tasks and goals of particular communities of users?
- What problems do particular groups of users face in attempting to exploit networks for the accomplishment of those tasks and goals?
- What design, management, and policy strategies can alleviate those problems and maximize network use and effectiveness?

These, and similar questions can be approached by developing and implementing on-going user-based evaluations of networked information services. To date, the Administration has inadequately considered such ongoing evaluation or required evaluation components in various Federal programs to determine the degree to which NII programs are, in fact, "successful."

POLICY RECOMMENDATIONS

Space does not permit a detailed discussion of the various policy recommendations that might be made to accomplish the goals outlined earlier in the paper. The IITF, however, should consider developing and implementing policy related to the following:

- Supporting public libraries to serve as a safety net for providing universal access to the NII and promoting network literacy to the public;
- Expanding the role of the Department of Education in supporting educational uses and applications of the NII in the nation's schools and libraries, e.g., the development of AskEric [an Internet-based reference and referral service];
- Insuring that the commercial applications and uses of the NII directly support, in part, public uses and applications of the NII; and
- Promoting the on-going evaluation and assessment of the NII to determine its impacts on society and to provide on-going feedback to policy makers about how best to develop and regulate the NII.

I would be pleased to provide to the IITF additional detail regarding these and related policy recommendations related to extending policy for the public uses and applications of the NII.

Indeed, an important role for the IITF is to broaden the topics for public policy discussion in open forums and hearings on issues such as those identified above. Policy debates regarding the NII must go beyond technical and systems-based issues, beyond commercial applications of the NII, and move more into public purpose goals of the NII and the Federal role in supporting public uses and applications of the NII.

RECONNECTING SOCIETY AND PROMOTING THE PUBLIC INTEREST

The NII, as defined in the *"Agenda"* (p. 5), fails to consider the societal institutions that also comprise the NII—institutions such as the library. Indeed, the role of libraries and other similar public agencies are hardly mentioned, or mentioned only in passing. The evolving role of the public library in the networked environment can incorporate the traditional safety net role that insures the public's access to the NII. A Federal role for supporting the educational applications and public uses of and access to the NII is essential.

Experts knowledgeable about new technologies and the likely evolution of the NII tell us that future uses and applications are limited only by one's imagination. Network literacy, the ability to identify, access, and use electronic information from the network, will be a critical skill for tomorrow's citizens if they wish to be productive and effective in both their personal and professional lives. A Federal role and responsibility in this area is to promote and support community networking (Center for Community Networking, 1993) and network literacy by collaborative efforts among providers, the government, and the library and education communities.

Information providers seem to find reasons not to plan and engage in evaluation rather than to do it. The public must have input on the networked services it is to obtain—and not receive an endless babble of senseless programming and services. An evaluation process of services provision encourages networked information providers to think about:

- The success of their current services
- Creating new and enhanced or innovative networked information services
- Responding to the information needs of network users
- Considering the impacts of these services on a range of other activities such as learning, productivity, health care, etc.

Evaluation forces providers and users to move beyond the day-to-day responsibilities and the day-to-day crises, to address two key questions: How successful are the existing networked information services we provide, and what services should we provide in two to three years? A program of regular user-based evaluation of networked information services will be essential to answer these questions. Federal policy is needed to support such ongoing assessments of networked services and programs.

There is an educational disconnect between the rapidly developing communications technologies and information resources available to the public, and the public's ability to use these resources. An elite few, typically academics, researchers, technology enthusiasts, and "network junkies," are network literate. While the gulf between these network literate "cybernauts" and those who are not continues to widen, the public policy system continues to be largely oblivious. Individuals in this

emerging networked society primarily "learn on their own" to be productive in and empowered by this new environment, or they are left behind.

The Nation cannot afford to leave some of the population behind as it moves into the NII, it cannot afford to have only those services and resources identified as "profitable" provided via the NII; and it cannot afford to have the NII become another divisive process that further disenfranchises some segments of society and inhibits these segments from being productive in both their personal and work lives.

Federal policy initiatives and more extensive public debate must occur for how public purposes in the NII policy area develops. The success and importance of the NII will depend on the societal values and goals (such as those discussed at the beginning of this paper), for which it is intended to promote. These goals must be extended beyond economics, commercial applications, and technical development of the NII.

APPENDIX A

NCLIS Plans Survey Of Public Libraries And Internet

Washington, D.C.—The U.S. National Commission on Libraries and Information Science (NCLIS) has announced plans to survey public library involvement with Internet, the global computer network of networks. A quick-response sample survey will be conducted in early January, 1994 to obtain baseline data regarding the impact of the Internet on public library services and activities. Survey findings about the extent of public library involvement with and use of network services will be analyzed to identify potential Federal policies relating to the public library role in the developing a networked information infrastructure for the Nation.

NCLIS will publish a project report in the early Spring of 1994. Dr. Charles R. McClure, professor at the School of Information Studies at Syracuse University and Dr. Douglas L. Zweizig, professor at the School of Library and Information Studies at the University of Wisconsin - Madison are co-principal investigators for NCLIS for the public libraries and the Internet project. Public libraries in the sample survey will be selected from a universe file developed by the National Center for Education Statistics (NCES) in cooperation with the National Commission and State Library agencies.

Timely, reliable data describing current public library Internet/network use and the impact of the Internet on libraries and communities they serve, are required to implement recommendations made at the 1991 White House Conference on Library and Information Services (WHCLIS) which call for the development of national "information superhighway" network to "...be available in all libraries and other information repositories at every level."

The NCLIS survey project also responds to aquestion raised at a July, 1993 policy dicussion meeting held at the Library of Congress. At this meeting, Vice-President Gore asked to what degree public libraries can serve as a "safety net" for access to Internet information and services. The Vice President also raised issues related to how the Internet could provide better social equity for the public. Several policy proposals that affect the development of libraries in this new networked environment

are under consideration by the Congress and the Administration. These proposals require current National data about public libraries and the Internet to make informed decisions about future government roles involving public libraries and the information infrastructure.

The following representative topics and issues illustrate the type of information that is expected from the project:

- Degree to which public libraries have operational connections to the Internet
- Type of provider that the library uses to obtain connectivity
- Number and type of people in the library that have Internet addresses
- Internet services and resources that are used by the librarians and their assessment of these services and resources
- Library prorgams or services that have been developed that incorporate Internet use
- Barriers or problems related to using the Internet
- Estimated expenditures and costs for connecting to and using the Internet
- Special arrangements by which libraries are connected to the Internet e.g., state network users, Federal grant recipients, subsidized Internet access rates, etc.
- Libraries which are not presently connected, but are planning for Internet access in the near future.

The U.S. National Commission on Libraries and Information Science is a permanent, independent agency of the Federal government charged with advising both Congress and the President on matters relating to national and international library and information services, policies, and plans.

For additional information, contact Peter Young, Executive Director, NCLIS, 1110 Vermont Ave., Suite 820, Washington DC 20005 (202-606-9200).

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Philanthropy and the "Agenda for Action"

Karen Menichelli[1] and Andrew Blau[2] for the Benton Foundation

The National Information Infrastructure: Agenda for Action describes a rich, new communications environment with broad potential to enhance the lives of millions of Americans. Yet after careful review, leading foundations and nonprofit groups share the same concerns that they have had in dealing with the existing media environment: access, diversity, content, quality, training, equity. Foundations and nonprofits are our best experts in many of the areas that the *Agenda for Action* suggests will be transformed by this technology. They have a stake in seeing the NII deliver on its promise to overcome the limitations of the past. The Administration must include that reservoir of experience as it develops policy and guides the creation of tomorrow's NII.

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1 KAREN MENICHELLI is Associate Director of the Benton Foundation. She serves on the board and as program chair of the Washington Regional Association of Grantmakers. Ms. Menichelli is also on the Steering Committee of Grantmakers in Film, Television, and Video, co-chair of the Communications Committee of Funders Concerned About AIDS, and a former president of the Communications Network in Philanthropy. Prior to joining the Benton Foundation in 1982, she was a telecommunications policy analyst at the National Telecommunications and Information Administration.

2 Andrew Blau coordinates the Communications Policy Project of the Benton Foundation. The Project seeks to strengthen public interest advocacy in communications policy by building a new constituency among nonprofit groups on these issues. Prior to joining the Benton Foundation, Mr. Blau worked for public interest groups, including the Electronic Frontier Foundation and the United Church of Christ, and researched the policy implications of network evolution while on the staff of Columbia University's Institute for Tele-Information. He is the immediate past chair of the Alliance for Community Media, and sits on the Public Information and Education Committee of Independent Sector, the national coalition of over 800 voluntary organizations and foundations committed to the strength of the nonprofit community.

The funding community has become increasingly aware of the dramatic changes occurring in the communications arena and of the opportunities and challenges those changes represent to their grantees in the nonprofit sector. The predicted changes in how Americans learn, communicate, inform, and entertain themselves will fundamentally transform the work of nonprofit groups concerned with such issues as health care, education, community development, environment, homelessness, and children.

One reason for this awareness is that funders have come to understand the limitations of the existing media environment for education and advocacy activities on the issues that they care about and in which they have invested substantial funds. Funders have been dismayed by a public media environment that is marginalized with insufficient resources, inadequately diverse, and reluctant to deal with controversial issues and groups. The commercial media, with their bottom-line economic imperative, have been let off the hook of providing public interest programming and have been generally inhospitable to public interest advocates.

Historically, funders have been no strangers to media and new technologies. Funders played a pivotal role in creating and nurturing what has become public broadcasting. Note the hundreds of millions of dollars that the Ford Foundation originally invested in educational broadcasting to test the noncommercial potential of a new medium; or the seminal Carnegie Commission that articulated a public broadcasting system as a national goal; or the millions of dollars that funders large and small have contributed to NPR and PBS and the independent works they carry.

Funders supported the media reform movement since its inception. They were concerned about issues of diversity of voices and access to the channels of communications and supported litigation, policy research and analysis, and public education around those issues. They watched with dismay in the '80s as a climate of deregulation gutted the public interest provisions of the past.

They have responded to the pleas of grantees struggling to computerize and supported the emergence of an infrastructure of technical assistance providers helping nonprofit organizations move into the computer age. With foundation support, technical assistance providers also helped

groups tackle electronic networking for information dissemination, collaborative work, research, and access to valuable government and other information about their communities.

Funders fostered independent voices with an infrastructure of media arts centers serving the independent film and video producing community and the growing number of community groups that are working with producers.

Over the years, they have supported programming initiatives that challenge our current media marketplace to engage children (Sesame Street), history (Eyes on the Prize), alternative voices (The Independents, POV), culture and the arts (Dance in America), and public affairs (Frontline, Moyers specials).

The public interest values affirmed in the *Agenda for Action* are encouraging to those who fear a narrow, commercially driven vision of the communications future. While the media have emphasized movies on demand, home shopping, gambling, and computer games, the Administration has focused attention on the NII as a tool for tackling our toughest social challenges—education, health care, community development, and the civic life of our nation. If that commitment to public interest values and applications is borne out in government policies and programs, the NII will have a profound and direct impact on philanthropy and our society. But we must acknowledge the difficulty in coming up with mechanisms to give teeth to the rhetoric.

For that reason, we'd like to reinforce some messages in the *Agenda for Action* and encourage more attention to others that are not fully dealt with.

We are heartened by the central place given to universal service as a policy goal and subject for much needed analysis. All Americans should be able to share in the public service benefits of the NII. We commend efforts at outreach to various constituencies across the country in hearings to get public input on the goal of universal service and how to achieve it.

However, as evidenced in a recently published series of papers stemming from a Benton Foundation symposium, the key policy challenges will be moving from the goal to defining a universal service package and determining how to pay for it. The answers will not be reached easily, but the Administration is taking the first necessary steps

in resolving them. It is essential that the answers promote equity for all users.

But the Administration's concentration on the issue of universal service leaves unattended the important issues of content. The infrastructure vision appears preoccupied with the technological conduits assuring connectivity and transmission of information. What are we to be connected to and for what purpose? Who is going to provide content? How do we ensure a diverse and robust programming mix on the NII, not simply more of what is already available on commercial channels? We need to answer these questions to make sure that the information superhighway is worth traveling. To do so, we take advantage of the human infrastructure as well as the technological.

First, NII demonstration programs like the one created in NTIA can be critical catalysts for content. They will not have enough money to transform society, but, if used creatively, can point to opportunities that others can immediately see value in, replicate, and bring to scale. For lasting impact, it will be important that the demonstrations build on existing projects serving human needs, not flashy uses of the technology, and look to take existing projects to a next step via technology adoption or enhancement. And we must look beyond those applications explicitly suggested in the *Agenda for Action* and also nurture applications dealing with the cultural and civic life of the nation, the community information role of libraries and other intermediary institutions, the need to cultivate public spaces on the NII, and innovations that motivate students in our primary and secondary schools.

Foundations invest hundreds of millions of dollars each year in human networks providing social services, cultural enrichment, educational opportunities, health care access, and citizen empowerment. Technology may play only a small part in those settings. But the base is a strong one on which to build technology that will meet human needs. The federal government's funding should not be done in a vacuum. Foundations may be able to identify useful examples of existing projects that may provide appropriate settings for pilot NII projects.

Second, we need to ensure a vital human infrastructure that will nurture the community of information providers and producers that will determine the available content. We need to ensure that all voices, especially those not ordinarily heard—nonprofits and independent voices

—have an opportunity to offer programming on the NII at affordable rates. And we must guarantee that there is meaningful interaction possible for all users. We must also ensure that intellectual property rights are protected in order to encourage the fullest possible participation of information producers in the NII.

Third, the Administration cannot ignore the role of education and technical assistance in delivering the benefits of the NII. We need to build the capacity of the public and the nonprofit community to participate as information providers as well as consumers in the emerging NII. There are nonprofit technical assistance providers in cities around the country that provide workshops on technology, training in the use of technological tools, and access to technology. The Administration can take advantage of these intermediary groups to foster the participation of nonprofit groups and the citizens they represent. For instance, it might be appropriate to conduct regional NII forums involving these groups.

Lastly, the NII promises to foster the values of citizen participation in our democracy, but the mechanisms need to be affirmed: The public and nonprofits must participate in the process of defining, developing and governing the NII. Independent oversight functions created by foundations or their grantees will be necessary to ensure that the needs of the nonprofit community are addressed by the NII. Citizens and organizations must have easy, affordable, and unhampered access to government information at the national and local level (e.g., census, environmental hazards, and bank loan practices). Above all, we must be able to ensure that all individuals are able to participate and benefit from the NII regardless of race, class, sex, ethnic background, and geographic location. We need to make special outreach to traditionally underserved populations. Voices on the NII should reflect the diversity of our nation; jobs and business opportunities generated by the development, construction, and use of the infrastructure should benefit all citizens equally.

In conclusion, to ensure that the NII achieves the public interest vision articulated in the *Agenda for Action,* the Administration must be concerned with both content and the human infrastructure that will provide and use it. The government therefore has a responsibility to support both the technological and the human elements of the NII. The foundation community and the nonprofit sector have unparalleled experience in the delivery of public interest applications, yet these key

constituencies are underrepresented in the *Agenda for Action*. The true value of the NII, and the vision pictured by the Administration, will come through a shared effort that fully incorporates the expertise of this "third sector" with the efforts of private industry and government.

Create a Corporation for Public Network Applications: Beyond the Information Superhighway

Eli M. Noam[1]

The Clinton Administration has set up a high-level Task Force whose mission is to flesh out the concept, advanced especially by Vice President Gore, of the information infrastructure. The idea is to create a framework in which the private sector can speed up the construction of advanced telecommunications infrastructure, without forgetting rural America or spending too many scarce budget dollars.

Putting together the sectors in which America is strong—communications networks, media entertainment, and computers can have great benefits for economic growth, opportunity, and mobility. But we must also prepare ourselves to deal, from the beginning, with its undesirable side effects.

Let us recall how much the Interstate Highway system changed post-World War II America. It transformed the way we live, work, shop, and socialize. It radically changed the cityscape. In the 19th century, the railroads similarly remade the American social geography. Might not the electronic superhighways have similar effects, far beyond those of making the American economy more competitive?

The powerful digital fiber highways and byways linked in a diverse network of networks, together with new generations of smart personal mobile communicators (also under consideration in Washington), that might end up in everybody's lapel, will create a society whose members

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1 ELI M. NOAM is Director of the Columbia Institute for Tele-Information and a Professor of Finance and Economics at the Columbia University Graduate School of Business. He has served as a New York Public Service Commissioner, engaged in telecommunications and energy regulation. His publications include over a dozen books and about 200 articles on domestic and international telecommunications, television, information and regulation subjects.

are ubiquitously interconnected. It would be naive to imagine that these new capabilities would be used just for the same old purposes.

In the 70's Marshall McLuhan predicted the emergence of the "electronic global village," an inspiring image, communal and peaceful. But instead, technology is helping to create narrow and specialized electronic neighborhoods, "telecommunities" of people with shared interests and outlooks. As one gathers distant electronic friends and colleagues, the local bonds of community weaken. The work environment, similarly, loses its territorial connection. Many white collar workers will not work at any particular location or employer, but will be tethered electronically to "virtual" corporations of internetworked managers who bid for particular skills from freelancers.

Given the limitations of humans to interact and to handle information, if one develops better and cheaper routes of communication, old ones atrophy. Communications technology connects people in new ways, which also means that it disconnects people from traditional community patterns. One example is religion. Today's electronic churches gather adherents through satellite channels, 800 numbers, and telemarketing, in the process weakening traditional denominations and neighborhood churches that are a mainstay of community. Another example is politics, where the term "political network" becomes one of telecommunications reality as electronically mobilized organizations develop outside the established parties.

The federal initiative of the information infrastructure will accelerate these tendencies. As one reshapes communications, one inevitably reshapes communities. If traditional community institutions are worth preserving, they must modernize into telecommunities to serve their constituencies in new ways, or else they will decline just as Main Street did when shopping centers and malls came on the scene.

Mainstream community organizations are slower to transform themselves electronically than business enterprises or fringe non-profit organizations. To reshape institutions electronically requires initiative, money, and expertise. In many cases, it will not be profitable enough for commercial operators. Grassroots efforts are essential, but they need to be supplemented by the resources and expertise of the information industry, government, universities, and computer enthusiasts. One way to do so is to create a non-profit Corporation for Public Network

Applications, funded by industry and government. Such an organization would provide seed money and channel expertise to various local pilot projects. Rather than developing leading-edge technology for advanced users, it would help technically small, unsophisticated, but socially important non-profit organizations to modernize themselves. The corporation, and its equivalents on the state level, could experiment, evaluate, inform, and recommend. Its non-governmental status would help it to be supported primarily by private sector money, and to draw unbureaucratically on the enormous creative energy of the computer network community.

The policy conclusion should not be to slow the rapid evolution of a high-technology infrastructure. But we should be ready to deal with some of the inevitable negative impacts, too, in a way that the planners of the automobile highway system never did when it came to the cities.


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