

CC 96-45

# Alliance for Public Technology

901 15th Street NW, Suite 230, Washington, DC 20005-2301 202/408-1403 (Voice/TTY)

RECEIVED

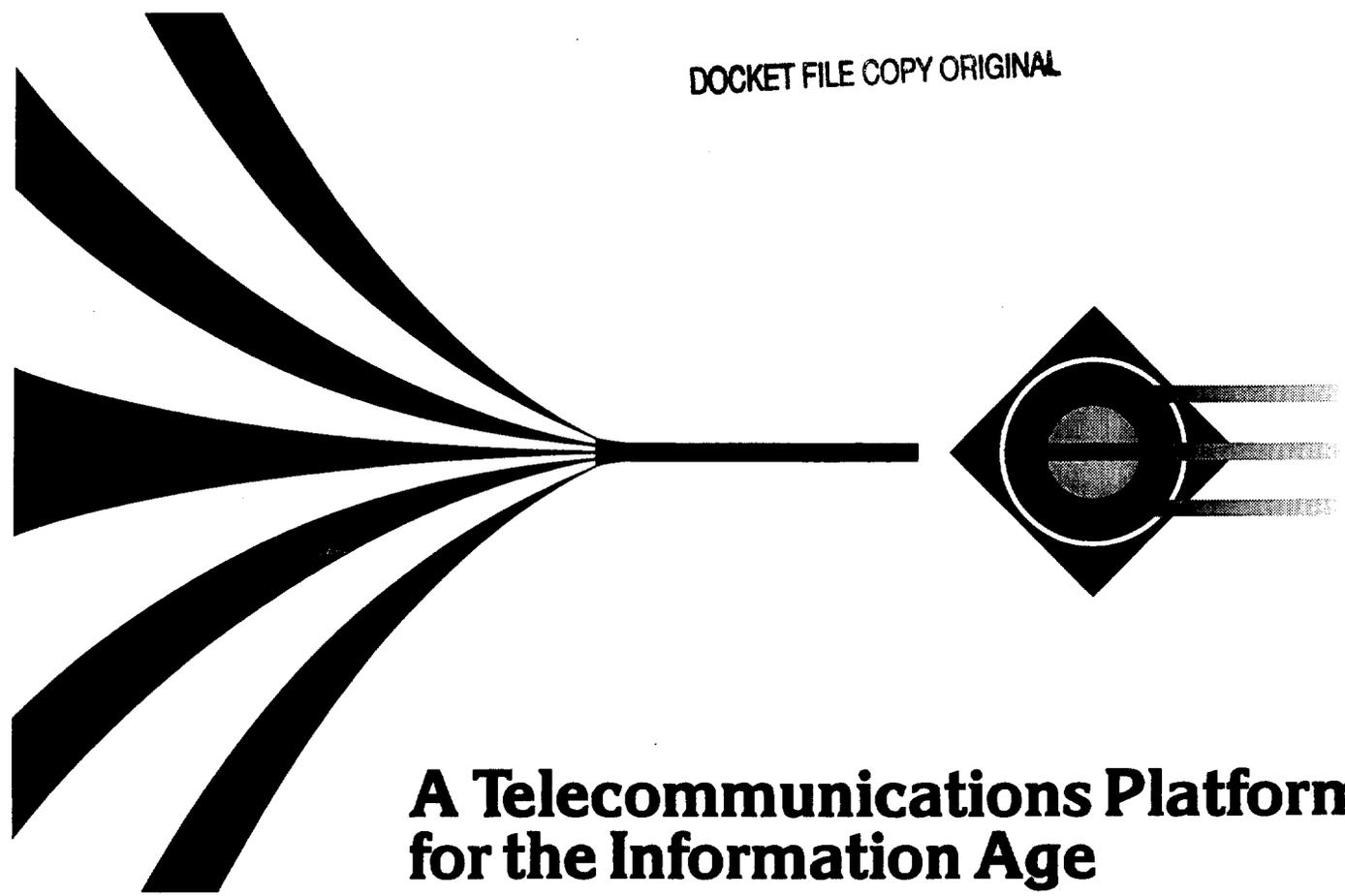
EX PARTE OR LATE FILED

NOV 14 1996

Federal Communications Commission  
Office of Secretary

# Connecting Each to All

DOCKET FILE COPY ORIGINAL



## A Telecommunications Platform for the Information Age

No. of Copies rec'd 1  
 List ABCDE \_\_\_\_\_

---

# **Connecting Each to All: A Telecommunications Platform for the Information Age**

## **Introduction**

The Alliance for Public Technology (APT) is a coalition of individuals and more than forty nonprofit groups with thousands of members. We believe that our nation cannot reap the full benefits from advances in telecommunications technology unless everyone has full access to a switched broadband network that provides information and services as well as entertainment. The more people on the network, the greater the demand for innovative services that can be marketed both here and abroad. Economies of scope can benefit all citizens, regardless of race, age, economic status, functional limitation or location. By connecting each one to all the others, we strengthen the fabric of society. At the same time, we promote economic development and help people to strengthen their individual identities.

This document updates and expands a 1990 APT paper entitled, "An Information Age Agenda: The Telecommunications Services Platform." Since 1990, telecommunications technology and policy have changed considerably. The cost of fiber optic cable, a central component of modern networks, has dropped to almost that of copper cable. Rapid advances in applications software, miniaturization, signal processing, video compression, mobile communication, and other telecommunications capabilities, such as fiber rings in major cities, as well as the new broadband transmission services provided by cable television operators have brought some aspects of our vision closer to reality and have made new opportunities possible.

At the same time, the Federal Communications Commission (FCC) has taken steps to reduce federal regulation in the telecommunications arena, including opening up more of

the telecommunications transmission spectrum to the private sector, reducing restrictions on ownership of radio and television stations in a single market, and authorizing Bell Operating Companies to offer video dialtone. The National Telecommunications and Information Administration (NTIA) has released a major report on U.S. telecommunications infrastructure, emphasizing its importance to today's economic, social, and political landscape and calling for more deregulation of telecommunications markets. The federal courts have lifted the restriction that prevented the Bell Operating Companies from providing information services. Congress has passed a law to set up the powerful National Research and Education Network (NREN), and it has overridden President Bush's veto of legislation regulating cable television.

APT's updated vision still focuses on the need for a "telecommunications platform" that provides universal access to a wide variety of information services. The types of services that should be supported, however, are no longer limited to "narrowband" voice and data. Two-way interactive multi-media applications (including integrated voice, data, and video) are proving successful in trials across the nation. It is time to begin considering how these opportunities will be made available to everyone who needs and wants them. We therefore call for upgrading the public telephone network to a *Broadband Telecommunications Platform* that supports two-way interactive multi-media applications. Other nations are already on the way to this goal. Japan, for example, has launched an extremely ambitious fiber-to-the-home program that could make it the world's telecommunications leader by the early part of the 21<sup>st</sup> Century.

Information is the currency of democracy. APT believes it is the essential component in strengthening the domestic economy and increasing equality of opportunity in the Information Age. APT supports public policies that will speed the day when everyone has access to a *Broadband Telecommunications Platform* and the informative and entertaining services it would be able to support. Universal access to the network and its services will:

- Empower individuals to obtain information and entertainment when they want it and in a form useful to them.
- Empower information providers, who will be able to offer diverse innovative services to everyone on the network.
- Empower our nation, making it competitive in global markets against nations that have already adopted policies leading to national broadband networks.

## Today

Jim has just left the military as part of the downsizing. He and Ulrika, his foreign-born wife, return to his hometown, only to find that the local factories are not hiring. Subsequently, Jim takes a job as a short-order cook. Enrolled in the local public school, his children find themselves behind in some subjects and ahead in others, reflecting the different emphasis of their overseas education. The teacher also notes some behavioral adjustments and would like to meet with the parents, but Jim cannot leave his new job to meet with her, and Ulrika's English is not adequate for a parent-teacher conference. Jim and Ulrika, unable to make a start in their chosen home and worried about their children, move to the nearest large city where each take jobs as grocery clerks.

## Tomorrow

A few weeks before Jim's demobilization, he starts his job search on the universal telecommunications device in his home on the overseas military base. He enters his preference for living in his old hometown and lists the skills he has acquired during his military stint. The job locator service identifies a job in the right area, but it is not one of the old factory jobs he expected. Instead, it is a job in a new credit card processing center that has located in his rural area where housing is cheap and the necessary telecommunications are available. Unfortunately, the job requires certification in repair of certain electronic components—certification that Jim lacks. He immediately enrolls in a job training program, getting lessons over his universal telecommunications device. He takes practice tests, reviewing portions he does not understand with a live tutor he can see and talk to from thousands of miles away. Finally, he takes the "written" portion of the certification exam. He gets the job and he and his family move.

Ulrika, Jim's wife, whose native language is not English, studies at home while the children are in school. The kids, finding that they are well ahead in math because of their European educations, are able to study advanced math taught by a teacher in the large city fifty miles away. They work to overcome their relative disadvantage in English literature by taking an electronic tutorial during study halls when they have time. Worried about the children's reluctance to participate in the less structured school activities, the teacher arranges a video conference with Jim and Ulrika during the school day, "meeting" him at his job and her at home. All three agree to work together to speed the adjustment to the new school and friends.

## Today

Ann and Jim are struggling to find an attractive living situation for Jim's father, Walter, who is 78. Walter adamantly refuses to consider moving into a nursing home, but a few recent mishaps in Walter's apartment have convinced Ann and Jim that Walter needs closer care. Ann, Jim, and Walter talk about the choices. Ann and Jim talk to their friends about this problem and vow that they will start attending the local "Eldercare Options" meetings held once a month at the community center, but they find it difficult to make the evening meetings. They compile an informal list of retirement communities and nursing homes, relying on friends and information sent by their local social service agency. Then they call each home, asking about location, services, and prices. They struggle with "telephone tag" and a few hard-sell sales representatives, and finally compile a list of four places that seem to meet Walter's needs. They juggle their schedules to set up visits. Meanwhile, Walter talks with some friends in his apartment building who steel his resolve about not going into a nursing home by telling him horror stories of regimented schedules, nosy nurses, and exorbitant prices. When Ann and Jim tell Walter about their visits, he is furious, accusing them of trying to "bury me before I'm dead." Ann and Jim leave, feeling both frustrated and guilty.

## Tomorrow

After Ann and Jim have talked with Walter about his situation, Jim goes to his study and turns on his terminal device—a TV screen with a little camera attached. Browsing the index of services, he finds three sources of information about housing opportunities for older citizens. One, supported by a senior citizens' community center, includes maps of locations, lists of services, and current prices and availability. There are even videos for several of the institutions, which provide a "walking tour" through their facilities. Curious, Jim looks at several videos. He forwards the information and videos about two of the institutions to Walter's video-mail account so that he can look at them later. In his apartment, Walter logs on and retrieves Jim's message. He learns that one center is a member of a network of eldercare centers that hold nightly "video meetings" on topics from fishing to financial planning; residents can attend from their rooms or with others in the center's video conferencing room. Walter joins one of the center's computer conferences as a guest. He is surprised to find that the participants talk about a wide range of topics, and they don't look or sound "old." Walter "meets" with the directors of two of the centers on screen. He finds out that both centers offer in-home care services, and that their health-monitoring facilities are connected directly to a local hospital. Walter also gets information about how to pay for home care and asks the centers to send him additional information on both topics. He also consults an on-line independent health costs information service. When Ann, Jim and Walter get together again, Walter explains the cost-saving alternative of home health-monitoring and home care services, and all agree that a move to a center offering home health monitoring services is best.

## The Alliance Vision: Universal Broadband Services

The “tomorrow” scenarios on the previous pages describe how some people will be able to communicate within the next fifteen years. We want to make sure that these communication opportunities are available to all people who want them, in their homes, and at reasonable prices. We expect that the transition from current technologies, services, and usage patterns to our “tomorrow” scenario will last well into the first decade of the 21st Century, but we believe that today’s events are shaping the course of that transition. Actions can be taken today that will help ensure that our “tomorrow” scenarios are not limited to the affluent.

The Alliance believes that it is now time to adopt a national goal: a universal *Broadband Telecommunications Platform*. By “broadband,” we mean a network that is capable of carrying multiple channels of switched interactive multi-media communications (voice, data, and video). In order to connect each individual to everyone else, and to diverse sources of information, entertainment and services, the network must have four physical characteristics in addition to its broad bandwidth:

- digital switching
- interoperability
- security and reliability
- usability

It must be available universally on a common carriage basis, and it must provide privacy and intellectual property protections. In this section, we describe these characteristics in more detail. Following that, we discuss policy and regulatory options.

### A. Functional Features of the Broadband Platform

#### 1. Universal Service

Probably the most important characteristic of the *Broadband Telecommunications Platform* is that it should be universally available to all citizens in their homes, public schools, and health care centers. The concept of “universal service,” first developed under the Communications Act of 1934, should no longer be limited to Plain Old Telephone Service, the term that’s used to describe voice telephony, but should be extended to new communication capabilities.

One of the important features of a *Broadband Telecommunications Platform* is that its benefits increase when more people are connected to it. Universality of service is more than an issue of equity; it also makes good economic sense. Imagine a telephone system that only connects customers to twenty or thirty homes or businesses: users would not be willing to pay much for that service. The value of the public telephone network lies in its ability to connect each user to millions of other people in the world, including many whom they

don't know. In the future, the value of integrated and interactive multi-media services will depend upon all citizens, businesses, and organizations having these capabilities.

Universality is especially important if our many public and private service agencies are to take maximum advantage of new information technologies. A motor vehicles department or local school system can justify the transition to electronic communication if each can reasonably expect to reach all their constituents. The *Broadband Telecommunications Platform* is a formula for stretching public dollars and creating more efficient services.

## 2. Common Carriage

As common carriers, telephone companies are obligated to make their service offerings available to any customer willing to pay the going rates; they are not allowed to discriminate. Common carriage has two important implications in an era of advanced telecommunications. On the one hand, owners and operators of the public switched network should continue to be obliged to serve all customers. On the other hand, network operators should also be obligated to make the platform available to any service provider. If society is to assure that the benefits of the Information Age are available to all citizens as customers and as service providers, then it is important to have a public network with a common carrier obligation.

## 3. Privacy and Intellectual Property Protections

As we take advantage of the efficiencies of centralized databases, remote searches, and new "publishing" opportunities, we need to be certain that the legal infrastructure is in place to protect privacy rights and sort out questions of ownership of electronic data and images. We need to raise society's level of sophistication about the implications of the Information Age in terms of our personal liberties and responsibilities.

# **B. Physical Characteristics of the Platform**

## 1. Broadband

Bandwidth refers to the range of signal frequencies that can be carried by a communications channel. One way of characterizing this capacity is to measure the number of digital signals in bits per second that a conduit can carry. These are generally characterized as "narrowband" (less than 128 kilobits per second); "wideband" (up to about 45 million bits per second); "broadband" (over approximately 50 million bits per second).

Today, "broadband" is commonly used to mean the bandwidth necessary to carry one or more uncompressed television-quality video signals, although improvements in transmission and signal processing are constantly increasing the amount of information that can be sent through a given-size conduit. While it is possible that compression may enable a full motion video to be transmitted one-way over copper wire, we expect that the need for two-way visual high-bandwidth applications will increase. We believe that seeking a broadband

network now will be far more cost effective in the long run than operating on undocumented assumptions that narrowband communication will meet the foreseeable needs of the public.

This anticipated increase in demand for interactive video points to the implementation of fiber optic cable as a major component of a broadband network, with wireless and other wired technologies supplementing it. The cost of fiber has now dropped to the point where it is generally used for new construction. Along with the wireless technologies, its cost will continue to fall, so that widespread deployment of fiber optic cable will become economically feasible.

While the interexchange carriers' networks are almost one hundred percent fiber, the local telephone companies' fiber networks currently predominate in the trunk and feeder portion of the network. Local telephone companies are planning upgrades, however. Cable television companies are also investing in fiber, again mostly in the trunk and feeder portion of the network. While coaxial cable (which makes up most of cable companies' networks) is capable of carrying a full-motion video signal, almost all of these systems were designed as one-way services. Cable companies are currently experimenting with ways to upgrade their systems to provide limited interactive capabilities, such as "pay-per-view" video entertainment.

## 2. Digital Switching

Switched networks allow users to establish communications with other users when desired. Once established, these connections can be switched mechanically. Telephone operators used to frantically plug and unplug wires on a switchboard. Digital switches can now perform this task electronically, with more speed and accuracy.

Only digital switching is capable of handling data at the high-bandwidth rates that interactive full-screen video services would require. Almost all switches in the interexchange networks are already digital; the percentages of digital lines of the local telcos range from 37 percent to 86 percent.<sup>1</sup> High speed switches and their accompanying software are now coming on stream commercially. At the same time, laboratories are working to perfect "optical switching," a technology that operates directly on the digital light pulses that flow through fiber, rather than converting them to electronic signals first.

## 3. Interoperability

A third technical characteristic of the *Broadband Telecommunications Platform* is that it must be capable of handling messages from a variety of equipment and in a variety of formats. This is generally called "interoperability." With the explosion of competition in the telecommunications industry and the plethora of new telecommunications applications, we can expect that users will continue to deploy a wide variety of public and private networks. They will need to do this "transparently." The transparency of the plain old telephone network was a key to its usefulness—a caller could pick up the phone, dial a number, and ex-

### **Current Applications: Limited Multimedia and Broadband Experiments**

The California Board of Education has adopted "Science 2000," an innovative, multi-media 7<sup>th</sup> grade science curriculum that relies on computer terminals and voice/data/video links instead of textbooks.

Bergen County, New Jersey has contracted for a fiber-based interactive network to connect its 44 secondary schools with two local community colleges by 1995; 14 schools and the two colleges are currently using the network.

GTE's Cerritos Project is a test-bed that provides video-on-demand and video teleconferencing to schools and residents in Cerritos, California. Users can choose from a library of videos and view them almost instantly in their homes or classrooms. They can also set up spontaneous full-motion video teleconferences with other users.

The Research in Advanced Communications in Europe's CAR project is working to develop an integrated broadband network to link automobile manufacturers, design teams, and parts suppliers. The network will support voice, video, and high-speed data communications.

The Interactive Cinema Group at MIT's Media Laboratory is developing an interactive digital movie system that would allow viewers to download videos to their home, request supplementary materials (reviews, information on the movie, etc.), and even customize the movie by choosing the desired degree of sex and violence and/or one of several endings to the movie.

In 1991, doctors in Boston used an experimental transmission system to relay high-definition images from Belize, South America in order to study patients suffering from a skin disease. The pictures were of such high-quality that the doctors could clearly see the changes in patients' skin as a result of the disease.

In 1992, doctors in Austin, Texas monitored dialysis patients at Giddings State Hospital, 65 miles away. They used a video camera to see and talk with their patients; they were even able to see the color of the toes of their diabetes patients, an indicator of physical well-being.

The nonprofit Hanover Foundation for Informed Medical Decision Making in New Hampshire has developed video programs to help patients choose treatment for four common ailments: benign prostate disease, low back pain, high blood pressure and early stage breast cancer. The interactive videos tell viewers about the risks and benefits of different treatments. Surgery rates fell sharply for patients with benign prostate enlargement who used these tapes.

Since 1991, members of a large HMO in Burlington, Massachusetts have had access to a health care information and consultative system via a terminal. The system enables them to get recommendations for steps to take with respect to specific symptoms that they are experiencing and also to get information about general health conditions of concern to them. In this way, they can communicate with their health care center and avoid "telephone tag" with doctors.

Martin Marietta has linked its Electronic Systems Division via a fiber optic broadband network, using voice, data and video communication to facilitate telecommuting for a portion of its off-site employees. The system allows workers to work from remote sites at least part of the week.

pect to talk to any person hooked up to the network without knowing just how the connection was made. This transparency will be much more difficult to achieve in today's multi-media, multi-vendor world. Yet the value of the platform will lie in the user's ability to connect with any other person without worrying about what kind of equipment, software, or network is being used.

#### 4. Security and Reliability

As telecommunications services support more and more of our everyday activities, the security and reliability of the telecommunications infrastructure becomes essential. The *Broadband Telecommunications Platform* must incorporate adequate mechanisms for protecting users against theft, interception, or tampering with the electronic messages transmitted over the network. Developing plans for responding to emergencies that could affect the reliability and viability of the network will require a great deal of coordination among public and private network administrators and equipment manufacturers. It will be necessary to design networks that incorporate redundancy in order to protect the whole network from the failure of any of its parts.

#### 5. Usability

The growing percentage of older Americans as a proportion of the population and the passage of the Americans with Disabilities Act has opened our eyes to the wide range of sensory, cognitive, and motor requirements of our citizens. We can no longer talk about "the handicapped" as if they were a small, definable portion of society with specific, highly-specialized needs. "They" are us—people who have difficulty seeing or hearing or remembering or walking. We now recognize that the problem is we can not get over the curb, whether it is because we are in a wheelchair or because we're pushing two children in a stroller.

The Alliance believes that the services of the *Broadband Telecommunications Platform* must be designed with all users in mind. Telephone systems already provide means for the hearing-impaired to use the telephone. Today, this is typically accomplished through an operator who types messages conveyed by the hearing party. Similarly, when text-based services are made available, service providers will have to make arrangements for them to be delivered audibly for the visually-impaired. Services which are designed to be accessible in several different ways from the outset offer a choice of interfaces for all customers, not just those with "disabilities." In this way, the public telecommunications network will become the electronic "curb cut" of the Information Age and will eliminate the need for a third party to translate or mediate difficult equipment.

It makes sense to us to think of "usability" is an evolutionary characteristic that should be continually updated to meet the needs of users by taking advantage of new technologies. The goal is to make communication—via voice, data, text, video, or multi-media—as easy and effortless as possible. The need for interoperability, discussed above, is relevant here. With protocol conversion and translation capabilities built into a central public resource, the

*Broadband Telecommunications Platform* will help make true "usability" a reality for all customers.

## **C. Transition to the Broadband Platform**

APT believes that to offer everyone two-way voice, video, and data, the *Broadband Telecommunications Platform* must have digital switching capabilities and is likely to rely in large part on fiber optic cable. It is obvious that this optimal platform will not appear overnight. However, without appropriate public policies, the transition will occur more slowly and will benefit only a limited number of people, primarily large businesses in urban areas. This would connect a few users to each other rather than each to all. In the following section, we discuss public policy that will ensure that we receive the greatest benefits from the *Broadband Telecommunications Platform*.

### **Making It Happen: Public Policy for the Broadband Telecommunications Network**

APT believes in the efficiencies and benefits of competition. We also believe that regulation will be essential to ensure that competition and universal service are compatible goals. Competition is most beneficial when it takes place inside a framework that defines the *Broadband Telecommunications Platform* as the natural evolution of universal service. To achieve that goal will require amending the Communications Act of 1934 to extend its definition of universal service to all forms of communication: voice, data, image graphics, and full motion video.

A regulatory framework that promotes the *Broadband Telecommunications Platform* will have to differ from the present framework in another important way: it will have to *eliminate the differences among the various communications media*. Because universal service applied only to wired telephony in 1934, it was more strictly regulated than the broadcast medium, radio. When television became available commercially, it was treated like radio. Today, television, radio and cable TV remain lightly regulated. At the same time, print media is virtually unregulated.

In 1993, the differences among these communications media are more apparent than real. Newspapers are delivered by satellite (like a broadcast) to presses in remote cities. Like telephone, local access television signals are delivered entirely by microwave, satellites and wire. All these signals are or can be digital. For example, as high definition television (HDTV) becomes available, more and more video signals will be digital. Thus the distinctions among the media are outmoded. A regulatory framework for the 21<sup>st</sup> century will focus on ensuring public access to all kinds of services no matter what form they take. To accomplish this goal, it will be necessary to *look at the service being regulated*, rather than at the company or technology.

If the opportunities of interactive multi-media are available only to those who can build or rent private networks, then the value of the public network will decline as the innovative leaders divert their telecommunications dollars into private network investments. The public network will become a low-tech network of last resort. In contrast, if these innovators remain on the public network, they will demand services that will benefit all users, large and small. What is more, they will be willing to pay for these services even when they are new and relatively expensive, because they will be able to reap the benefits of them most quickly. This approach assists large users because it provides easy access, cuts costs and assures system compatibility.

Finally, upgrading the public telephone network to a *Broadband Telecommunications Platform* will help ensure the widespread use needed to encourage the growth of new information applications. If private networks cannot "talk to each other" and cannot reach users who are not on a private network, then the development of sophisticated information services will be slowed. Interoperability, a characteristic of a *public switched network*, can be achieved by developing standards and translation capabilities.

A regulatory framework to support development of the *Broadband Telecommunications Platform* must:

- assure universal service for two-way interactive video services
- assure interoperability of public and private networks
- safeguard privacy and intellectual property
- encourage planning for security and reliability
- promote fair competition
- promote affordable services
- break out of the current regulatory approach that distinguishes among providers based on old technologies
- encourage innovation in services and technologies
- establish guidelines for levels of performance and reliability

Developing this regulatory framework will take more than tinkering with the existing rules. It will require new thinking based on current technological advances. The overall goal will be to develop the *Broadband Telecommunications Platform* as the new form of universal service. A national task force on telecommunications policy would make an excellent forum for developing such a comprehensive view. But the task force must not delay in offering the results of its deliberations, as many decisions are now being made that could limit the actions open to policymakers.

## **Paying for the Broadband Telecommunications Platform**

Some experts disagree about the financial viability of building a broadband network in the United States. However, the Alliance agrees with those experts who believe that the platform offers enough benefits to make it an attractive investment.<sup>2</sup> Among the benefits are:

- reduced cost of delivering health, education, and other government services
- improved quality of these same services
- improved access to jobs and job training for all Americans, especially the economically disadvantaged
- improved access to social and economic activities of all kinds for those with disabilities and those who cannot read or speak English well
- reduced pollution as people substitute the network for motor transport
- increased innovation in the kinds of information services that will be in great demand for world trade

These benefits are best realized through a shared public network. For example, it would be difficult to charge customers for the benefits of cleaner air from other telecommuters' reduced driving. Because they cannot charge for these kinds of desirable outcomes, network operators have less incentive to invest in a public network than is justified by the total social benefits. Public policy must be devised to provide such incentives. In return, network owners and operators must be obligated to provide low-cost access to the network for all.

Focusing on old figures and untenable assumptions about a fiber optic network, critics of the Alliance's position argue that consumers do not want or need advanced telecommunications services and should not have to pay for the investment in the network through higher rates for basic service. The critics estimate the cost to convert the present public switched network to fiber at \$3,100 per subscriber, a net present value of a little over \$40/month, assuming a ten-year payback at twelve percent.

We agree that this is an unreasonable cost if all consumers would have at the end is Plain Old Telephone Service provided by fiber instead of copper wire. We also agree that continued regulatory oversight is necessary to ensure that appropriately low rates are available for minimal usage. Universal service has always rested on subsidization; that is, using money to help out those who cannot pay full rates or those who live in places that are especially costly to serve. The need for subsidization will continue when universal service comprises advanced information services.

However, we think the critics err in two ways:

- 1) Their cost estimates are too high, and
- 2) They ignore the extraordinary benefits people will receive in return for higher rates.

The cost estimates are too high because they do not take into account the declining cost of technology. They also fail to consider that much of the investment in advanced infrastructure would have been made in any case. In effect, they count some of the investment twice.

More important, we do not agree that low volume users do not need or want these services. A quick look at our today/tomorrow scenarios and the list of applications now being tested will show that they benefit all citizens regardless of race, economic status, functional limitation or location, so long as they are easy to use and widely accessible. Public investment in the broadband network should be judged in the same way as all other investments: not on the basis of current costs but on the basis of the benefit-cost ratio; that is, whether

present and future benefits exceed current costs. We have shown that the benefits of a *Broadband Telecommunications Platform* are enormous and accrue to everyone -- businesses, individuals and the nation as a whole in the form of economic development and global competitiveness. With appropriate public oversight, these benefits can and should be available to everyone for affordable rates.

## Conclusion

The Alliance for Public Technology is committed to the widest possible access to the most advanced telecommunications services at reasonable rates. These rates would be subsidized, if necessary, for people who cannot otherwise afford them or for regions where the cost of service would be unusually high. Rapid changes in technology have only confirmed our original premise: that every consumer in our nation could be connected to every other consumer in a way that allows easy exchange of voice, data, and video signals. The challenge we face lies in mobilizing public will to ensure that the *Broadband Telecommunications Platform* achieves its promise to carry the nation forward into the 21st Century with a strong economy and a strong people.

The next step is to engage in dialogue about the relative merits of this, and alternative, visions. APT's mission is to get the public involved in learning about telecommunications opportunities and participating in policy debates. We have initiated public debate, but we still need to invest in information and education campaigns. Our members, as representatives of various consumer interest groups, are in a good position to carry out such education. We hope that this paper will provoke debate and raise people's understanding of the opportunities telecommunications can offer, as well as the extensive planning and preparation that will be necessary to realize those opportunities.

We have presented a vision for the future of the public switched network that operates as a *Broadband Telecommunications Platform*, supporting interactive multi-media services to the nation's homes and businesses. We have also outlined some of the characteristics that we believe the network should have. We offer this vision for the consideration of telecommunications decisionmakers and other public interest groups like ourselves, so that future telecommunications policies will be made with the interests of all consumers in mind.

There is broad national agreement that the United States' position in the global economy in the 21st Century depends upon the creation of an advanced national telecommunications infrastructure. We want to make sure that this new infrastructure is both equitable and accessible for all of our country's citizens. *By connecting each to all*, we promote economic development, strengthen the individual and benefit all members of society.

## Endnotes

- <sup>1</sup> Ray Smith, "Cautious—Not Complacent," *Telephone Engineer and Management* 96(2), 1992, p. 36.
- <sup>2</sup> See, for example, Anita Taff, "U.S. Fiber Network Could Be a Boon for Users," *Network World* 9(9), 1992, pp. 19-20 and Bruce Egan, *Information Superhighways: The Economics of Advanced Public Communication Networks*. Boston: Artech House, 1991, p. 118.

## References for Applications (page 8)

(New Jersey) Alan Daley, "Broadband Networks: Bringing the Information Age to Schools." *Tech Trends* 36(2), 1991, pp. 13-17.

(Cerritos) "Broadband Tests Expand to Cerritos," *Ed* (6)4, 1992, p. 5.

(Europe) Kerry Morgan, "The Integrated Communications Requirements in the Automotive Industry and RACE Project CAR," *Computer Networks and ISDN Systems* 21(4), 1991, pp. 321-322.

(MIT) Carol Hildebrand, "Movie Technology Puts an End to Bad Endings," *Computerworld* 26(20), 1992, p. 28.

(Boston) Andrew Purvis, "Healing by Wire," *Time* 139(20), p. 68.

(Martin Marietta) Tom Smith, et. al., "Fifth Annual User Excellence Awards: The Rest of the Best," *Network World* 6(50), 1989, pp. 47-49.

# Acknowledgements

The Alliance for Public Technology wishes to acknowledge Dr. Barbara O'Connor and Dr. Susan Hadden as principal authors of this paper. It was through their tireless efforts that APT's vision took both form and substance. The Alliance also wishes to thank its members who reviewed earlier drafts and provided additional insight. Drs. O'Connor and Hadden worked to ensure that individual comments and suggestions were woven together so that each reinforced and strengthened the other. Their work embodies APT's vision by connecting the ideas and contributions of "each to all." For that, APT is truly grateful and appreciative.

## Board of Directors

Dr. Barbara O' Connor, Chairperson  
Institute for the Study of Politics and Media  
California State University, Sacramento\*

Mary Gardiner Jones, President  
Consumer Interest Research Institute\*

## Board Members

Dr. Rene F. Cardenas  
Educational Policy Consultant

Helen Nelson  
Consumer Research Foundation of San  
Francisco\*

Gerald E. Depo  
Town of Bloomsburg\*

Rosilyn Schleife  
K-12 Physical Education Teacher

Henry Geller  
The Markle Foundation\*

Dr. Arthur D. Sheekey  
Education Policy Analyst

Dr. Susan G. Hadden  
LBJ School of Public Affairs  
University of Texas, Austin\*

Vincent C. Thomas  
New York State Department of Economic  
Development\*

Ruth Jordan  
The George Washington University Medical  
Center\*

Donald Vial  
California Foundation on the  
Environment and Economy\*

Deborah Kaplan  
World Institute on Disability\*

\*Organization is for identification purposes only.