

Universal Service:  
Policy Options for  
the Future

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## Universal Service: Policy Options for the Future\*

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Universal service is the name given to the level of telecommunications service that public policy regards as so essential it must be available to everyone at a reasonable cost. The new telecommunications technologies offer the possibility of expanding the nature of universal service, but there are many public policy controversies surrounding this redefinition. Unfortunately, most of the debate is defined and conducted by those companies who expect to provide the communications network or the information that will be available over it. This is a brief guide to the policy issues underlying universal service.

*What is different about the "new telecommunications technologies"?*

- a. The technologies are converging. Until a couple of decades ago, it was relatively easy to distinguish among the three major communications technologies: print, broadcast (over-the-air), and telephone/telegraph, which were delivered by wire. However, a couple of decades ago, the technologies began to converge. Now, any signal, whether originally voice, video, or data, can easily be digitalized (turned into the 0s and 1s that a computer understands) and transmitted through any medium. Cable TV, for example, delivers television signals through wires. National newspapers (print) are delivered to printing presses in remote cities by satellite (over the air); cellular telephone uses radio frequency spectrum. The convergence of the communications media is reflected in the recent rash of company mergers and purchases: telephone companies and newspapers have bought cable and broadcast facilities, while cable companies are acquiring companies that offer mobile telephone, newspaper, and other kinds of telecommunications services.
- b. The technologies offer entirely new capabilities to users. The new telecommunications technologies differ from the earlier ones in the speed and quantities of information they can carry. With "data compression" (putting information into a smaller space) and optical technologies huge quantities of information can be delivered very rapidly. So-called "broadband" networks, usually defined as ones that carry about 50 million bits per second, are capable of carrying one or more uncompressed television-quality video signals; this in turn means we can start to think about the possibility that people will be able to send as well as receive video signals in their homes. Such "interactive video" means that patients will be able to see their doctors from their homes.

*What kinds of benefits can we reap from a broadband interactive network to the home?*

Better health and education services. Isolated areas without hospitals, or health care professionals and doctors practicing alone in rural areas, can benefit greatly from

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\* The contents of this document are identical to those of an issues paper being distributed for the Telecommunity Conference to be held at the Lyndon B. Johnson Library, Austin, Texas, on November 4 and 5, 1993. The conference, entitled From Public TV to Universal Access: Bringing Home the Electronic Highway, will include panels that consider groups of these issues. The background paper for the conference ties specific questions to individual panels; that information has been omitted from this version.

telecommunications. Already, several programs in Texas provide interactive telemedicine to rural communities, with doctors able to see, diagnose, and treat patients far away. Making these services available in people's homes will benefit busy working families and housebound patients as well as health care professionals. Similar benefits can accrue in education. Students can attend classes that are being taught elsewhere, reducing waste from small classes and expanding the curriculum at every school. Montana, where most schools are isolated, has developed a statewide network linking all the schools. Students working at home or school will be able to obtain multimedia materials from all over the world, select those that respond to their interests and needs, and prepare their own multimedia materials for homework. Parents can become more involved in their children's educations as they work with their children on these projects.

Economic development and international competitiveness—improving the marketplace. One important benefit of advanced telecommunications is increased efficacy of the market. People will be able to search for information about products and purveyors easily, obtaining up-to-the-minute information about cost and quality at any level of detail they want. Buyers will have access to more sellers, strengthening competition. Sellers will have access to more buyers, allowing development of niche markets and meeting the needs of nonstandard consumers. Potential customers whose attention is captured by a good price or colorful picture seen on a TV-like screen in the living room could obtain additional information at the click of a button. For example, people trying to decide where to eat out could get a picture of a restaurant's interior, view a menu, and obtain a map showing how to reach the restaurant. Another click could allow the people to be connected directly to the restaurant to make a reservation or speak with the chef about dietary restrictions.

Easier contact with other people. Individuals will also benefit from being able to contact other people easily—as when a parent wants to send a note to other members of the PTA. Other benefits will derive from the ability of the technology to overcome physical limitations or distance, allowing grandparents to play board or card games with grandchildren in a different city, providing information audibly for those with failing eyesight, or providing real-time two-way access to people using sign language. Applications for licenses and other local services will be done from home, while telecommuting will enable people to work at home, even "meeting" with suppliers, customers, or peers without the need to travel downtown or to distant cities. People with disabilities can be empowered to work with information using different means: audio only, video only, touch screen, point and click, voice activated, and so on. These same diverse access mechanisms will give flexibility to everyone.

Higher quality government services at lower cost. For example, the legislature of Alaska, a very large state with a low density of population, maintains nine staffed legislative information offices around the state, along with an additional 67 volunteer-staffed locations in smaller communities. These locations support teleconferences, computer conferences, and faxing. In 1991, about 1,000 teleconferences were held between legislators and their staffs and about 25,000 participating citizens.

As these examples suggest, benefits are likely to accrue to every individual. But the examples do not begin to suggest how great the benefits will be to society as a whole, whether through reduced medical costs for everyone, better government services, education that really equips people to be productive, or through economic development in rural and urban areas alike.

*What does it mean to have "broadband to the home"? How will it get to people's homes—will there be one or more than one network, and how will networks reach from the distribution point into the home?*

To work as most people hope it will, the network must have four features:

- broadband—carry video signals in both directions along with voice and data
- switched—allow any user to connect to any other user (like the present telephone network)
- compatible—allow users/networks with different equipment or information formats to communicate (many people call this feature "interoperability")
- secure and reliable—protect privacy while ensuring continuous, high-quality operation.

These four physical features underlie a fifth characteristic, which is not physical but concerns network operations—a characteristic without which the full benefits of the network cannot be achieved:

- openness, or allowing any person to originate information in any format.

At present, two networks with at least some of these features reach into people's homes: the telephone network, which is switched, and the cable network, which is broadband. Many observers believe that both industries will make the necessary alterations in their networks and will then compete for the home and small business markets. A third network that reaches people's homes is the electricity network, which could be altered to deliver digital signals. Some believe that after a period of competition, one provider will emerge as dominant, much as AT&T became the dominant telephone company in the years before World War II. The recent rash of company mergers across technological lines, combined with several important court decisions, have changed the environment within which the network will be developed, but few people are sure just how.

Although discussions of broadband to the home up till now have focused on wired technologies of cable and telephone, rapid advances in non-wired technologies have given people new ideas about the nature of the network. Over-the-air technologies could be used in all or part of the network: taking the signal from the curb into the home, delivering signals to people in areas too isolated to be reached easily with any kind of cable or wire, or delivering signals to neighborhoods from small transmitter stations. Thus, broadband services may be delivered to the home by cable, telephone, some other technology, or some combination of technologies.

*Should we adopt a national goal of ensuring broadband services to and from the home? If so, when?*

In their book *Putting People First*, President Clinton and Vice President Gore enunciate a goal of a high performance (broadband) network linking "every home, business, lab, classroom, and library by the year 2015." Some consumer and many business and industry groups, including high technology manufacturers and the seven regional telephone companies, also believe the nation should seek broadband services to the home, although they have not always proposed specific dates. Some consumer groups and public interest groups initially opposed the goal, suggesting that it might be a means for forcing small consumers to pay for network upgrades that would benefit only large businesses. While many of these groups now agree that benefits to consumers, the elderly, the disabled, rural dwellers, and small businesses will justify adopting such a national goal, they remain concerned about equal access to the network and reasonable costs for services delivered over it.

*Does the present regulatory framework promote the goal of broadband to and from the home?*

Most carriers and information providers argue that the present regulatory framework is so complex and outdated that it stifles initiative and actually inhibits attainment of the goal of delivering a broadband network to people's homes.

Federal, state, and local governments all play different roles in regulation; in addition, the regulatory framework differs for the different telecommunications media: radio and TV, cable TV, telephone, satellite, and mobile communications. The complexity of the regulatory framework is further exacerbated by distinctions now made among different kinds of telephone service: long-distance service has generally been deregulated, while basic local service providers are regulated. Even these local service providers are subject to different kinds of regulation, because some states continue old-style rate-of-return regulation while others have adopted regulatory reforms, ranging from almost complete deregulation to incentives. Localities impose differing requirements on their cable franchisees.

Several states have formulated plans for a long-term telecommunications policy, but have limited their concerns primarily to ensuring the spread of fiber optic cable. Although regulation of basic and certain other telephone services remains a state prerogative, many states are also hoping for some federal leadership, since the issues appear to transcend state boundaries. Coordination of regulation will have to be achieved across federal, state, and local lines.

Although most people agree that the present regulatory framework will not promote rapid deployment of a broadband network to the home, there is strong disagreement about the remedies. Many of the interested parties advocate deregulation, pointing to inequities in treatment of companies that offer similar services and the lack of incentives under current regulation to expand the broadband network. They argue that with restrictions lifted, competition will drive down prices and increase the demand, eliciting investment in new services. As noted, many consumer and nonprofit groups are worried that deregulation will create conditions under which large customers receive advanced services at low prices while small customers pay higher prices for basic telephone or cable. Almost everyone recognizes that the benefits of the broadband network can be achieved only when many people, including small customers, are fully connected, and they are concerned that this will happen too slowly or not at all with complete deregulation. Unfortunately, the policy debate continues to be framed in terms of technologies, such as "telephone" and "cable TV," rather than in terms of the kinds of services or features of the network that should be available to achieve the public interest.

*Are there incentives for creating health, education, and other public services on the network?  
Will such public services emerge from an unregulated, competitive information industry?*

For public service applications to be available on the network, first someone must create the information or services and then the network operators must agree to carry the services. Both of these conditions may be difficult to meet in a fully unregulated marketplace.

In a fully competitive system, companies would invest in the broadband network to the extent that they expect to receive revenues. Many people believe that the largest profits will not come from carriage or transmission but rather from the services delivered over the network. Most companies assume that the only services that are profitable are entertainment, shopping, and what we might term "personal information," including current weather, airline schedules, some

current news, and so on.

It is easy to see why companies believe that other kinds of services might not be profitable. In the case of entertainment, the person buying it receives almost the entire benefit of the service. A person can easily decide whether she wants to pay \$3 to see a movie at home. Companies can determine demand and set prices accordingly. In contrast, the benefits from many public services accrue throughout society, a little bit to each person. Although the total benefit may be high, no one person receives enough of it to pay the full price for the service. For example, suppose a company decides to provide information about preventing a heart attack. Each prevented heart attack may save the health care system \$10,000 or more. But since no individual knows whether it is his heart attack that will be prevented, he will not be willing to pay more than a dollar or so for the information, which the company may need to sell for \$2 to make a profit. Thus companies cannot "capture" the benefits in the prices they charge, and they are unlikely to make a profit on these kinds of public service applications.

Because the services are not profitable, it is unlikely that a fully deregulated, competitive telecommunications system will make a wide range of education, medical, or other related services available without some kind of incentives.

In addition, network operators may have no incentive to carry the services, even if they are developed by nonprofits or other entities. If network operators are also creators of information services, they may not want to carry competing information. If network operators receive a proportion of the gross receipts from particular information, public services may not provide as much revenue as other kinds of services.

The content of the public services is likely to be developed by nonprofits and government entities, just as it is now, but only if there is a guarantee that these services will be carried over the network. Thus one important characteristic of network operations is openness: people who develop public service (or other) applications must be able to send them out over the network. One possibility is that these groups will pay network operators to carry the services, counting this as a cost of service just as they now pay for telephone and fax. Another approach is to provide tax or other incentives. A third approach could entail regulation, with government requiring all network operators to carry certain public services. This approach has a long history: before deregulation, the FCC required broadcasters to carry public service announcements and to offer equal time to opposing candidates and viewpoints.

*What are the features of the network that are necessary to provide public services?*

We have already identified some of the critical features of the network: it must be broadband, switched, interoperable, and provide for security and reliability. These physical features in turn underlie a necessary characteristic of network operations; namely, openness.

These features not take into account the quality of the transmission, however. People who are conducting demonstration telemedicine projects on the present network often argue that their needs can help define the quality of services that will be necessary, because doctors must have very accurate information in order to diagnose patients correctly. For example, doctors often use the color of the patient's organs to assess health; thus, the network must offer color video of a quality high enough to allow health professionals to use this diagnostic tool. Similarly, doctors must be able to see tics and tremors. Thus the speed and resolution of the pictures on the network must be good enough to make these problems visible remotely. Although others may

differ in their definitions of network features, it is important to recognize that by identifying desired network features rather than discussing technologies, we leave the way open for competition among technologies while still ensuring that network users receive the level of service they need.

*Once the network is built, how do we ensure affordable access for all?*

To ensure very widespread access to and use of the telecommunications superhighway, rates must be low enough to be affordable to most people. The Communications Act of 1934 mandated that basic local telephone service be available at reasonable cost to everyone; this goal—often called "universal service"—was achieved in part by allowing one kind of service to subsidize another through rate regulation. Many state public service commissions continue to regulate telephone rates in order to ensure that companies do not exceed a specified rate of return. A newer means for helping those who could not otherwise afford a telephone is the universal service fund established in many states; contributions from local telephone providers offer the means for providing direct subsidies for installation or payment of the monthly telephone bill to those who meet certain qualifications. Some states also impose a fee on all users or otherwise obtain funds to subsidize TDD services for the deaf.

Many people believe that extending the universal service fund is one way of providing even advanced services to everyone. A larger pool of companies, perhaps including information and entertainment service providers as well as those who own and operate the network itself, could contribute a very small percentage of their revenues to the fund, which would be used to subsidize basic services for those who could otherwise not afford them.

*What should constitute universal service in the 21st century?*

The concept of universal service, which is the basic level of service that public policy decrees should be available to almost everyone at affordable rates, originated in the understanding that the more people were on the telephone network, the greater the benefits for everyone. Right now, that basic level of service is local telephone. To obtain the full benefits from the switched broadband network, we may need to expand our definition of universal service.

Expanded universal service will have two components: receiving and sending information.

Just as Vice President Gore looked to the day his son would have the Library of Congress at his fingertips for homework, most people have focused on receiving information in the home. Universal service may define particular information as so important that it must be available to all. Some likely candidates for inclusion are those services that bring widespread benefit to the larger society so that it is in each person's interest to ensure that everyone else has them. These are many of the same services that are least likely to be provided by an unregulated marketplace; namely, health (preventive information, diagnostic information, and direct contact with health professionals) and education, including homework assistance, job training, and specialized teaching. No one argues that every aspect of these essential services should be included in universal service, but we must come to some agreement about which ones are so important they must be available to all.

In addition to information services of public benefit, universal service will likely also include aspects of the network that make it functional for users. That is, users must be able to search

through the vast quantities of information for the bits they need: universal service will doubtless have to provide a common search mechanism, just as telephone companies have provided telephone books and yellow pages. Private providers might offer more sophisticated searching tools for a fee.

Some observers have also argued for certain kinds of political and governmental information to be available as part of basic service, so that citizens can monitor and contact their governments. Many people imagine political debates on the network. The notion of electronic voting was popularized in the 1992 presidential election.

To obtain the full benefits of the network, universal service will also have to provide the ability to send information. For the telephone network, to be "on the net" (have access) is to be able to originate a message. But on the new network, we could be limited to responding to messages selected by others, purchasing items viewed on the screen or making a play in a commercially-offered game. Universal service will probably have to include the network operating feature we have called openness, allowing anyone to originate the full range of messages—voice, video, and data—and place them where they can easily be found by other people.

The debate over universal service, which has scarcely begun, will thus focus on the information and carriage services without which people cannot be full members of the economy and polity.

*What role, if any, should government play in ensuring universal service?*

Many people, especially presently unregulated telecommunications providers, argue that there is no need for government to intervene in any way. They believe that the market will provide rapid innovation and deployment of advanced telecommunications services, which will eventually reach everyone, just as television did. Other observers point to the concerns about public service applications and open access to carriage and suggest that there may be a larger role for government.

So far, the telecommunications policy debate has largely been phrased as a fight between competition and regulation and among regulated and unregulated technologies. The debate thus rests heavily on the present regulatory framework, which was established more than 50 years ago under very different technological conditions. The debate posits that government either plays no role or continues in its present role, creating inefficiencies and perhaps stifling innovation.

There is another role government could play, however. In other arenas, competition and regulation are not opposites but occur at the same time. For example, the breakfast cereal industry is highly competitive, but all competitors must meet certain government-imposed standards: Cereals must be manufactured under clean and safe conditions; the food must not have too many impurities; and cereal boxes must provide accurate information about the weight of the contents, the ingredients, and the nutritional value. We can imagine an analogous situation in the telecommunications arena. Regulators could ensure that service providers made their products in such a way that they could be obtained on a variety of equipment, that they provided at least the standard search format, that minimum standards of color, resolution, and speed were offered along with protections for privacy and provisions for network reliability, and that all subscribers to the network can send as well as receive information. In short, regulators may not determine rates directly but could help avoid creation of an information underclass.