Policy Analysis

Cato Institute Policy Analysis No. 310: Universal Service: The New Telecommunications Entitlements and Taxes

June 25, 1998

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Executive Summary

The debate about the universal service provisions of the Telecommunications Act of 1996 is mainly about how big the universal service fund should be and which services should be covered. Legislators, regulators, and other participants in the process barely addressed whether there is a real need for any universal service subsidies. There is not.

The 1996 act tempts populists and special interests with the opportunity to impose a hidden tax on the American people. That explains the strength of support for universal service subsidies. But there is no real need for subsidies for telecommunications services. Currently, 93.9 percent of U.S. residences have telephone service (more, 98.3 percent, have televisions). Even most of the poorest households have telephone service (87.1 percent); many have cable television as well (58.3 percent). The few that do not could almost certainly afford it, as it usually amounts to about 1 or 2 percent of their monthly budget.

Entrepreneurs in a free telecommunications market would respond to the strong demand for telecommunications service, even in high-cost markets such as those in rural areas, by finding ways to lower the cost of providing service to high-cost consumers. Perversely, universal service subsidies discourage the deployment of new technologies. Innovations are unlikely to attract investment if they must compete with established and subsidized "status quo" technology. Market forces will do better than government subsidies at providing cheap telecommunications services.

> Redistribution is in effect far less a redistribution of free income from the richer to the poorer, as we imagined, than a redistribution of power from the individual to the State.
>
> -- *Bertrand de Jouvenel* The Ethics of Redistribution

The universal service provisions of the Telecommunications Act of 1996 present a puzzle: How could Congress justify enacting such sweeping new subsidies in a "deregulatory" law? [1] The extensive debates surrounding the enactment of this vast new entitlements program do not supply the answer to that question--largely because no one asked it.

While critics of specific universal service regulations abound, almost no one has called for the abolition of universal service.[2] Many free-market advocates devote more energy to inventing market-oriented ways of implementing government subsidy regulations than to describing how free markets would solve the problem that universal service supposedly addresses.[3] Indeed, policymakers barely discuss whether the problem of information have-nots is real.

This paper aims to fill that gap and concludes that universal service subsidies are not justified by economics, by any reasonable principle of justice, or by common sense. Before imposing yet another system of tortuous regulations and hidden taxes on telecommunications providers and consumers, we must examine whether we really need a federal program to support the "information needy."

The 1996 act vested an extraordinary amount of power in the Federal Communications Commission to implement universal service,[4] including broad discretion to mandate access to telecommunications services for schools and libraries. [5] To pay for that, the FCC initially asked telecommunications companies (and hence their customers) to raise $2.25 billion per year. [6] Mandates to benefit rural health care providers led the FCC to ask for an additional $400 million.[7] The act also requires explicit subsidies for local, residential, and rural telephony, the traditional beneficiaries of universal service largesse. The fund for high-cost rural areas is currently $1.73 billion, but most analysts expect it to grow much larger. Office of Management and Budget and Congressional Budget Office estimates (probably conservative) project that the total fund will grow from about $3.3 billion to $13.4 billion. [8] CelPage, Inc., a paging company disturbed by the implications of being forced to pay into a fund from which it will not benefit, has challenged the FCC's universal service fees as an "unlawful tax."[9]

Controversy over the FCC's universal service order has begun to mount.[10] Some members of the Senate Commerce, Science and Transportation Committee have demanded that the FCC investigate reports that schools are asking universal service providers to supply items like computers, cameras, and printers, equipment ineligible for funding under the statute.[11] Several states have complained that the FCC's original order does not supply enough federal funding for high-cost areas. A June 4 letter signed by leaders of the House and Senate Commerce Committees asked the FCC to stop collecting money for the schools and libraries program and revamp its rules. And will consumers know how much of their phone bill is going to pay for universal service? Those controversies lead us to expect that Congress will reexamine universal service, which makes this an excellent time to undertake a fundamental inquiry into the program's justifications.

In this study I undertake such an inquiry and conclude that the current enthusiasm for universal service cannot be justified on grounds of economic efficiency, equity, or wise public policy--rather, it must be explained in raw political terms. That is, universal service programs are largely payoffs to politically influential groups. Markets alone would ensure that the benefits of the information age were widely shared, even among the poor. Congress should simply eliminate universal service subsidies.

Back to the Future

Does the history of universal service shed any light on the question of how universal service subsidies can be justified?[12] Universal service did not originate as a telecommunications entitlement program. Professor Milton Mueller, in his thorough history of universal service, recounts how Theodore Vail, the founder of the Bell System, first used the term "universal service" to refer to what we today would call "interconnection," [13] not to what we today would call "universal service." Vail meant that any telephone customer should be able to call any other telephone customer using only one telephone service. Only later did regulators use "universal service" to mean that everyone was entitled to telephone service.

Authorities on telecommunications often claim that the modern notion of universal service began with the 1934 Telecommunications Act. The preamble to that act says that the act's purpose is to regulate

> interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and worldwide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, [and] for the purpose of promoting safety of life and property through the use of wire and radio communications.[14]

That does vaguely express the philosophy behind modern universal service. But nowhere does the 1934 act actually call for subsidies or specify any subsidy mechanisms like those that emerged years later to support that philosophy, and there is no evidence that legislators envisioned such policies in the 1934 act.[15] Universal service subsidy mechanisms consisted mostly of regulatory requirements for rate averaging and cross-subsidies to bring affordable service to specific groups. Long-distance telephone service was priced to subsidize local service, for example.[16] But federal and state regulators did not begin to use their powers to regulate rates to establish any such cross-subsidies until 1952.[17] The subsidies started small and grew very slowly until 1965.[18]

Universal service as it emerged in the middle of the 20th century proved to be a good deal for the Bell System and the government. The Bell System provided telephone service to all areas and customer groups in exchange for a government-protected monopoly and served at least 80 percent of the telephone customers in the United States. [19] As a regulated monopoly, the Bell System could count on a guaranteed return on capital, while the government could take credit for universal service both as a social good--telephones would reach those who might not otherwise have been able to afford them--and a national good--a national telephone system would unify the country.

In the days of the unified Bell System, there was a certain logic to all of that. The Bell System provided good service to most consumers.[20] And universal service cross-subsidies, while they caused some economic distortions, were mostly matters of internal accounting. Raising the cost of long-distance service to subsidize local calls meant that AT&T Long Lines lost money, but AT&T's local Bell subsidiaries gained money.

The perverse logic of universal service collapsed with the breakup of the Bell System.[21] In a competitive marketplace, service providers shun high-cost subscribers unless they can charge high prices, which universal service mandates typically forbid. New carriers entered long-distance and business markets to undercut Bell System prices held high to support subsidies for residential and rural customers. First, new long-distance carriers like MCI entered long-distance markets. After the divestiture of the Bell System in 1984, the cream-skimming process continued in the local exchange. Local telephone companies found that they were losing highly profitable large business customers to upstarts such as Metropolitan Fiber Systems (MFS) and Tele-port (TCG),[22] while the Bells were still expected to provide service to unprofitable customers in, for example, rural areas. Competition made the old system of subsidies obsolete, as subsidy flows funded by monopoly prices began to dry up. Politics, however, ensured that universal service would live and grow.

Universal Service: What the Law Says

Regulators should have begun to resolve the conflict between new competition and old subsidies by phasing out universal service. Instead, the Telecommunications Act of 1996 called for new mechanisms to support the services funded by the old universal service mandates and extended universal service coverage to include new privileges for certain institutional users in the health care and educational sectors.

Section 254 of the Telecommunications Act of 1996 establishes six principles for "the preservation and advancement of universal service":

1. Quality services should be available at "just, reasonable and affordable rates."
2. Access to "advanced" telecommunications services should be provided "in all regions of the Nation."
3. "Low-income consumers" and those in "rural, insular and high-cost areas," should have access to telecommunications services, including "interexchange and advanced services that are reasonably comparable" to those provided in urban areas, at rates "reasonably comparable" to rates in urban areas.
4. All providers of telecommunications services should make "equitable and nondiscriminatory" contributions to universal service goals.
5. Mechanisms for federal and state "advancement" (funding) of universal service should be "specific, predictable and sufficient."
6. Schools, health care institutions, and libraries should be eligible for special rates and other concessions to ensure that they have affordable access to advanced telecommunications and information services.[23]

This study criticizes the idea of universal service provided by *any* subsidy mechanism, contesting the assumptions behind points one, two, three, and six.

Other sections of the act promise miscellaneous benefits such as requiring equipment manufacturers and service providers to ensure access to telephone service by the disabled.[24] Most provisions are frankly interventionist, establishing funds for small business and education.[25] Both funds establish a general industrial policy with vaguely egalitarian goals.[26] Only one provision, section 706, offers the hope of a more market-oriented approach, inviting the FCC to use "forbearance" and "promote competition" to speed the deployment of advanced technology.[27]

Given legislation so riddled with subsidies and Soviet-style "national funds," it is surprising that so much of the debate over universal service has revolved around *how* the program should be carried out rather than *whether* universal service programs should exist at all.

Bipartisan Support for Universal Service

People of almost any political stripe can find something good to like (or dangerous to oppose) in universal service. Universal service mandates in the 1996 act emerged from a Republican Congress, were translated into regulation by a "New Democrat" administration, and draw support from the egalitarian left.

The Specter of Information Have-Nots

Many in the public interest community support universal service out of concern for information have-nots. Their somewhat utopian demands target the same victims that typically concern today's egalitarians. Coralee Whitcomb, president of Virtually Wired, worries that the disadvantaged would be "railroaded" off the information track and appeals for assistance in connecting battered women to the Inter-

net.[28] She is particularly concerned that those in homeless shelters remain unaware of the wealth of information on the Internet. Many activist groups, including People for the American Way, National Council of La Raza, and the National Rainbow Coalition, called for "full equal and affordable access to a broad range of telecommunications [as] a birthright of citizenship."[29] Thus, today's universal service provides subsidies for the poor, children, the disabled, and even health care, at a time when Congress would never have supported, say, a large anti-poverty or health care program funded from general tax revenues.

The activists' noble concerns, which take form as more dubious demands for project funding, have somehow become mainstream. Numerous intelligent and powerful individuals have embraced the agenda of universal service activists from the belief that access to telecommunications facilities of various kinds will be critical to maintaining even a meager standard of living in America. The alarming vision of information have-nots has gradually achieved wide acceptance, despite the lack of rigorous economic arguments or evidence to support the idea.

It follows, for many, that the government should subsidize telecommunications for those who cannot afford them, whether they be low-income individuals or those in certain geographic areas and institutions. At a 1996 conference on universal service, fittingly entitled "Up for Grabs," senior Democrats sounded notes in harmony with universal service activists. Thus Rep. Edward J. Markey (D-Mass.) warned of a "social disaster" if we did not subsidize telecommunications services for schools.[30] Sen. Robert Kerrey (D-Neb.) advocated special arrangements for Indian communities. One Agriculture Department lawyer volunteered his agency as a source of subsidized technology entitlements.[31] Do not suppose that "Up for Grabs" was organized by the cyber-activists themselves, and somehow managed to attract a few lawmakers and administration hangers-on. The event was cosponsored by the National Telecommunications and Information Infrastructure, part of the U.S. Department of Commerce. Even the RAND Corporation, not usually thought of as a haven of leftist ideology, concluded after a two-year study that e-mail was so vital to everyday life that it should be made universally available as a matter of U.S. government policy.[32]

Both Vice President Gore and Speaker Gingrich share the vague dread that the information society left to itself will produce a class of "information have-nots," doomed to remain on the fringes of society. In a 1993 speech about

information have-nots, Gore asserted that "when it comes to ensuring universal [networking] service, our schools are the most impoverished institutions in our society," [33] thereby helping to promote the universal service concept that was ultimately embodied in the 1996 act. Even in the heady days of the "Republican Revolution," Newt Gingrich worried about the prospect of a "bi-modal society comprised of information haves and have-nots."[34] Though he has not strongly supported the most extreme universal service mandates, Gingrich has suggested giving the poorest Americans a tax credit to buy a laptop, adding, "Maybe that's expensive, maybe we can't do it, but [we should send] . . . any signal that we can send to the poorest Americans that says, 'We're going into a twenty-first-century, third-wave information age, and so are you, and we want to carry you with us.'" [35]

The leap from the importance of telecommunications to the need for subsidies to prevent the emergence of information have-nots is not based on any evidence or logic. There is every reason to think that telecommunications technology will spread through society just as automobiles, televisions, and flush toilets did.

Universal Service as Hidden Tax

Perhaps if universal service programs had to be funded out of general tax revenues--that is, if the hypothetical benefits were more obviously tied to visible real costs--the enthusiasm for universal service would wane. But the universal service mechanisms created by the FCC over the years provide a convenient round-about way of levying taxes. Asked why subsidies for Internet access for schools should not be funded from general tax revenues, then-FCC chairman Reed Hundt gave an illuminating answer. Though admitting that telephone companies would pass universal service charges on to phone customers, Hundt said that that did not matter because

> it'll be passed on to everyone in America in insignificant ways down to, you know, pennies per day. It will be a collective action by all America. . . . Probably the most equitable way that you could raise money for a national purpose would be through contributions by communications companies, because they cover the whole country.[36]

Hundt's statement reveals that he envisions universal service as a means of levying a tax on the American people.

At least the 1996 Telecommunications Act called for "specific [and] predictable . . . federal and state mechanisms" to fund universal service. That does improve on previous universal service fund mechanisms, which were "a rat's nest of implicit subsidies and accounting sleight-of-hands utterly unsuited to a competitive marketplace."[37] Explicit subsidies beat implicit subsidies because their level and impact can be more easily identified and debated.

Thus, the reality that universal service levies a tax has not gone unnoticed. Customers are distressed by the appearance of universal service charges on some bills. [38] One Florida school board with a $287 long-distance bill reportedly was also charged a universal service "pass-through" fee of several hundred dollars, perhaps a sort of rough justice, as educators clamoring for discounts on telecommunications services should have known they would not get something for nothing.[39]

Disturbingly, the response of supporters of universal service has been to try to *hide those charges rather than to eliminate them*. Some suspect the FCC of urging long-distance carriers to drop universal line items from customers' bills in private meetings. [40] An early version of one bill, S. 1768, would have required long-distance carriers to pay for universal service programs out of reductions in access charges.[41] Another bill, S. 1897, would require long-distance carriers to add a line item showing reductions in access charges along with universal service charges. [42] With or without disclosure of reductions in access charges and universal service charges, universal service means that consumers lose the chance of seeing reduced access charges in the form of lower prices for long-distance service. [43] Forcing long-distance companies to remove universal service charges from bills simply denies consumers the knowledge of the impact of universal service policy on their phone prices.

Whether one characterizes universal service as a tax or as something else, the bottom line is that consumers will pay. Either prices will be higher, price reductions will vanish, or telephone companies will have less money to invest in new

services and facilities.

The Rural Constituency

Conservative Republicans also favor universal service. [44] The chairman of the Senate Commerce Committee from which the Senate's version of the 1996 legislation emerged was a Republican from a rural state.[45] And while Republicans are generally more pro-free market on such matters, most still support the basic idea of universal service. Thus in early 1997, in a letter to then-FCC chairman Hundt, Sen. John McCain (R-Ariz.), the current chairman of the Senate Commerce Committee, and Sen. Ted Stevens (R-Alaska), another committee member, wrote,

> There is no disagreement over the merits of the goals set forth [regarding the universal service provisions contained in section 254 of the Telecommunications Act of 1996]. There is [only] considerable discussion and disagreement over how best to define and achieve them.[46]

The involvement of both political parties helps explain why the debate over universal service has been mostly about the distribution of the fund, not about whether universal service programs are justified. [47] Both Democrats and Republicans use universal service to cater to their constituencies--inner cities and the education lobby for the Democrats, rural residents in the case of the Republicans.

The Pot of Gold

Some people suggest that greed drives some of the enthusiasm for universal service:

> [A] horde of non-profit pleaders--all claiming to represent the public interest--are queuing up to get their chunk of the pie. . . . Smelling money, this vast array of activist groups hopes to use the law's universal service provision to establish a new communications entitlement that will encompass everything from free services for schools to [Department of Housing and Urban Development] grants for wiring housing projects to the Internet. The activists are egged on by federal agency officials who see deregulation as a threat to their sinecures. [48]

Certainly, the promise of the creation of a large fund will attract those hungry for money, helping to explain the approximately 40,000 pages of public comments filed with the Joint Board on Universal Service, the group of federal and state regulators convened to advise the FCC.

Then there are the corporations that are fearful of losing the corporate welfare component of universal service. In disputing components of the FCC's Universal Service and Access Reform orders, Ronald E. Spears, vice president of Citizens Communications, testified that "we believe rural customers--ours and others--deserve the very best when it comes to communications services." Spears also stated that "the FCC's action will make it impossible for Citizens, and other rural telephone providers, to continue with the current level of investment in the network infrastructure of rural America." His statements, while doubtless sincere, coincide neatly with concern about preserving subsidies to his own company. Given his position, such concern is understandable. But that hardly answers the question of whether subsidies for rural infrastructure can be justified in a more philosophical sense.

No one would seriously deny the growing importance of computing and communications in all our lives. [49] But universal service is politicized, inefficient, and unfair--a long way from the high ideals of its most fervent supporters. Support for universal service makes political sense, but it should not be construed as evidence that we really need those programs.

An Alternative Approach--Telephone Stamps?

The legislature's failure to even consider a way of funding universal service without hidden taxes and corporate welfare reveals just how far common sense about universal service has been subsumed by politics. Even if subsidies to some individuals can be justified, the current universal service scheme cannot. There is no reason that special telecommunications subsidies for the groups favored by universal service should exist as a separate regime outside of

means-tested, targeted general welfare programs.

The inequality that universal service intends to redress really does exist. Poor people do have less money to spend on telecommunications services than do the rich. Rural residents often have less adequate telecommunications facilities than do urban dwellers. [50] And school children would probably benefit from better access to computing facilities, although perhaps not as much as fans of a federally funded information superhighway believe. Those facts, together with the undoubted importance of telecommunications, produce a powerful emotional argument for universal service.

But can such an argument stand up to intellectual scrutiny? It is a tautology that poor people can afford less than rich people, whether the commodity in question is telecommunications or anything else. Similarly, rural regions tend to have fewer facilities of all kinds than urban areas--there is nothing special about telecommunications. Finally, public schools have varying resources, reflecting in part the fact that they rely on the vagaries of local funding. Thus, the "communications deprived" and those who are "deprived" in a broader sense are not really distinct groups.

That raises the question of why special programs should be put in place for telecommunications. Approximately 72 percent of families that are considered "poor" have clothes washers; for nonpoor families the figure is 93 percent.[51] Yet we do not expect the government to subsidize clothes washers. Presumably, the point of welfare programs is to supply individuals and families with enough money to afford the essentials, which should include basic telephone service as well as laundry. That telephone service is in practice subsidized under a number of separate programs is little more than a historical accident stemming from the arcane separations process.

Minor changes to existing legislation could establish a lifeline program to provide funding only for those low-income consumers whose health would be at risk if they did not get a subsidy. Under such a scheme money would, for example, be available for the low-income elderly woman with heart disease who lived alone on the grounds that, were she to suffer a seizure, her life would depend on her ability to summon an ambulance.

Quite possibly, private charities could ultimately run such a program. The initial government program would be narrow in scope, as few people would qualify for funding under it. Even for those who believe that civil society, not the government, should be primarily responsible for helping the poor, such a plan would be tolerable.

As a practical matter, federal and state regulators are in no position to demand that low-income telephone subsidies be transferred to larger means-tested welfare programs.[52] Congress alone could carry through such a reform. But though supported by a broad consensus of economists, [53] means-tested universal service schemes funded from general tax revenues (telephone stamps) get little political support and almost no discussion.

Universal Service and Cyber-Victimology

Only with difficulty can one generalize about the needs for and rights to telecommunications service of groups as disparate as the poor, rural dwellers, libraries, health care providers, and school children, given the rapidly changing technology and the subjective nature of those groups' needs and their different political statures. Focusing on the supposed justifications for universal service subsidies for the poor, and, in the next sections, on rural dwellers and schools, however, leads to skepticism about the need for subsidies generally.

The Limitless Affordability Calculus

The first stage in setting up universal service for low-income groups is to explore the extent of the problem of "affordability," as directed by the 1996 act.[54] Currently, 93.9 percent of U.S. residences have telephone service (more, 98.3 percent, have televisions).[55] That suggests that most Americans find telephone service quite affordable.

Consistent with that observation, the Joint Board described a common-sense approach to defining affordability.[56] Since penetration levels for basic services for residents (mainly voice services) are very high, the Joint Board concluded that those services are affordable.

But the board then introduced a **relative** component to the definition of affordability, a qualification that threatens to turn the populist universal service paradigm into a more radical egalitarian program. In defining affordability, the Joint Board concluded--and the FCC agreed--that

> the definition of affordable contains both an absolute component ("to have enough or the means for") and a relative component ("to bear the cost of without serious detriment"). [57]

The board argued that rates are not "affordable" if paying the rates "imposes a hardship" on subscribers in a certain area or on low-income subscribers.[58]

Had regulators been asked to establish a program for universal support for affordable food, they would no doubt have noted that McDonald's hamburgers are inexpensive in an **absolute** sense, but that certain segments of the population--occupants of homeless shelters, for example--could not bear the cost without serious detriment. Defining affordability as relative ensures that universal service becomes a mechanism for permanent income redistribution. After all, those who have less money face more difficult tradeoffs in choosing to purchase anything. The FCC conveniently extracted itself from those problems by concluding that the states are the "appropriate fora" for measuring affordability.[59]

The key consideration then becomes *whether any limiting principles are contained in the act or the philosophy of universal service*. If not, the "problem" of universal service can, by definition, never be solved, and it will be exceedingly difficult for state or federal regulators to resist the pressure of continued lobbying.

The 1996 act lists criteria for regulators to consider in deciding whether services should get universal service support, including whether the services

> (A) are essential to education, public health, or public safety;
>
> (B) have, through the operation of market choices by customers, been subscribed to by a substantial majority of residential customers;
>
> (C) are being deployed in public telecommunications networks by telecommunications carriers; and
>
> (D) are consistent with the public interest, convenience and necessity.[60]

Must a service nominated for universal service support fulfill only some, or *all*, of those criteria? [61] Allowing the FCC to nominate services that satisfy only one or two of the above criteria means that the services eligible for universal service support are in principle unlimited. Indeed, regulators might simply nominate any service they chose to under (D), the broad "public interest" standard. If Congress intended that result, one wonders why it bothered to list the other three criteria--and included the word "and." Unfortunately, the Joint Board and the FCC rejected the limited in favor of the unlimited approach.[62]

Finally, the Joint Board and the FCC could have limited the size and scope of universal service by targeting the subsidy to members of groups already identified by means testing as in need of help. [63] But many commentators favored less, not more, targeting. Some advocates wanted low-income subsidies to be extended to organizations that supposedly help the poor. Often such demands are obviously self-serving. For example, the Association of Community Colleges wanted community colleges to be considered low-income consumers. The Puerto Rico Telephone Company and the American Association of Retired Persons wanted eligibility for those who were under or just above the poverty line, regardless of whether those individuals would be eligible for other means-tested programs like Aid to Families with Dependent Children or Supplemental Security Income. The Joint Board said in its report, "Currently some states only make Lifeline assistance available to low-income individuals, who, for example, are elderly or have disabilities. We find that Congress' intent would best be served if all low-income consumers had access to Lifeline assistance." [64] The FCC concurred. [65]

The Joint Board and the FCC itself did not go overboard in their demands--this time.[66] But the absence of any clear

limiting principle in the rules means that there is nothing to stop universal service from growing into a huge boondoggle. [67] Although the FCC caps universal service expenditures in each category, caps can always be lifted. The weakness of the justifications for universal service partly (but only partly) stems from the absurd scope of the task the FCC has assigned itself.

"Affordability" in the Real World

The Joint Board's and the FCC's reluctance to establish a clear limit perhaps stems from the paucity of the universal service debate. A serious debate about why we should have universal service would have revealed that the lack of basic communications for the poor is grossly exaggerated--and the reasons for lower penetration rates among the poor largely ignored.

Difficulty in paying long-distance charges, not inability to pay for local service, is the main reason that low-income residents lose their phone service. [68] Still, penetration rates even in poorer homes are very high; 87.1 percent of households with annual incomes less than $10,000 (12,254,000 households total) have telephones, [69] and 58.3 percent of those with phones have cable television service; 13.1 percent also have cellular phone service.[70] Even for those who earn under $5,000 a year, the telephone penetration rate is a little over 76 percent. [71] The rates are clearly below that for the population as a whole, but for most consumer products a 76 percent penetration in the poorest of homes would normally be considered a major success, not a major failure.

The poor do spend a higher proportion of their income on telephone services than do the rich. But basic telephone service still represents a tiny fraction of the income of low-income consumers, who spend approximately 1 or 2 percent of their incomes on telephone service. [72] That figure suggests that while telephone service might be an essential (some do not view it as such),[73] it is an essential that virtually any consumer could afford by making minor changes to his or her spending patterns.[74]

One response is that telephone service is so widespread *because* of universal service, and penetration would decrease if universal service supports were removed. But that cannot be true of low-income subsidy programs like Link Up, as most eligible customers are not aware of the programs.[75] Indeed, many low-income customers are *paying*, through inflated long-distance rates or local service charges in urban areas, subsidies to support universal service.

And the "universal service preserves penetration" argument presumes that only universal service supports keep prices low.[76] Innovation driven by competition, in the long run, is the best and surest way of keeping prices and costs low. The continuous decline in computer industry prices is one good indicator of that.[77] Indeed, telephone penetration did not begin to grow rapidly in the United States until telephone companies began to compete, when the Bell Company's first patents expired in 1893 and 1894.[78] But competition is unlikely to take off until subsidies and price controls are abandoned.

Furthermore, the evidence shows that low-income consumers could absorb most price increases with little impact on penetration, particularly because phone service is so low as a percentage of their overall expenditures. In the 1980s the subsidy from long-distance to local services was reduced by levying a "subscriber line charge" of $3.50 per month, such that from 1984 to 1990 telephone rates increased--but penetration also increased, and the number of households without phone service decreased by 1.1 million.[79]

The Network Effect

One of the most widely heard arguments for subsidies to low-income telephone consumers, the "network effect" or "network externality" argument, holds that markets for telecommunications networks are prone to fail. The network effect theory posits that the benefits of a network to any given subscriber are proportional to the number of subscribers on that network.[80] That is because, the more people on the network, the more people who can be reached on that network by a given subscriber. But at some point customers already on the network might be unwilling to pay more to add a few more customers. Therefore, it follows that subsidizing low-income subscribers to bring them onto the

telephone network benefits, not just low-income groups, but everyone, because anyone connected to the network will be able to talk to more people.

That widely accepted argument makes some sense. The author of this study grew up in England at a time when phone penetration was quite low and when poorer segments of the community did not normally have phones. Thus, although my parents had a phone, several of the people with whom they wished to communicate regularly did not. If some program had taxed my parents to provide phone service for the poor, my parents would clearly have benefited to the extent that people to whom they wanted to speak would then have had phones.

But whatever the benefits of such a program, the network effect argument is not an example of a market externality, because there is no evidence that it would, broadly speaking, benefit everyone to more or less the same degree. That is, the people added to the network and their frequent contacts clearly internalize the benefits of adding more people to the network.

To continue my autobiography, my parents would have benefited from universal service in that a few people they knew would have gotten phones, but someone whose social circle consisted predominantly of those who had not bought phone service would have benefited a great deal more.

This case history suggests that the network effects argument for universal service subsidies is less an argument from the existence of a market externality than a demand for "social justice" and redistribution. Leftist critics often make no distinction between the two. For them, the existence of radical differences in the levels of wealth and income *is* a market externality in the sense that market forces will not do away with such inequalities. They are relatively uninterested in the fact that market forces generate a sufficiently high standard of living for even "poor" people to afford, say, a telephone.

Those who are inconvenienced by the fact that people they would like to reach regularly by telephone do not have telephones should consider simply subsidizing those people directly. Thus, for example, anyone who needs to check up regularly on an aged parent who cannot afford a phone might simply choose to pay that phone bill. Employers might help their low-income employees pay for phones, if they felt a need to contact those employees outside the workplace. If the phone was for the benefit of the worker, he could urge his employer simply to pay him more money and let him decide whether to spend it on phone service; but if the phone was for the benefit of the employer, he might want to pay for it directly. At any rate, there is no reason for taxpayers or telephone ratepayers to pay for it. In this case and others, there is no justification for societywide, government-mandated low-income telephone subsidies.

Markets for Lower-Income Consumers

Telephone penetration data show that while in wealthy and middle-class homes telephone installations are almost ubiquitous, in lower-income homes they are very, very common. That situation does not seem to offer much of a market opportunity for entrepreneurs to make money from the low-income consumers who do not have phones now. The situation might well change if prices in all phone markets were allowed to rise and fall freely. Yet even under price restrictions, entrepreneurship coupled with a little technology can work wonders.

Consider New York City, where recent immigrants often lack telephone service, perhaps because they lack a credit history or have had their service cut off for making overseas calls that they are unable to pay for. Even in such an apparently infertile field, market forces can provide for needs without any claim on the public purse. Since early 1996 a company called Microtel Communications has been providing phones to such customers and other New Yorkers who do not get service from NYNEX (now Bell Atlantic). Microtel allows its subscribers to make local calls and to reach directory assistance and 911 service for $23 per month. When customers want to make calls outside the metropolitan area, however, they must pay in advance at one of Microtel's centers, established throughout the city. Having paid for their call, they can talk until their money runs out. Using that unsophisticated commercial system, Microtel satisfies a need that advocates of universal service would insist can be met only through government interference.[81]

Telephones and Country Living

Perhaps even less justified than the promise of an apparently limitless subsidy program for low-income Americans is the component of universal service that provides subsidies for telephone service in high-cost areas, especially rural areas. Universal service for high-cost areas is--almost by definition--one of the most expensive parts of the universal service program. High infrastructure costs in those areas mean big subsidies. One estimate of the subsidy for local service before implementation of the 1996 act puts the it at over $8 billion.[82] One analyst estimates total subsidies in the telecommunications market at $184 per year for every U.S. family; more than half of that money goes to rural areas.[83] The current fund is expected to grow to at least $10 billion, not counting state contributions. The federal fund will supply only 25 percent of the subsidies to high-cost areas, leaving the states to come up with the rest. That has distressed many states; some hope for a 100 percent federal contribution.[84]

It is troubling to see, given the expense of the rural subsidy program, the weakness of the justifications for it. In a competitive market, companies could and would seek higher profits in high-cost areas by deploying technology that would reduce the costs of serving those areas.

Universal Service and the Calculation Problem

As with low-income subsidies and the affordability calculus, the trouble with subsidies to high-cost areas begins with an unhappy series of regulatory gyrations. Once Congress decided that rural and other high-cost areas would be subsidized, regulators were left to decide how much the subsidy should be. The idea was to give the high-cost phone company enough of its "costs" for it to set its prices at the level of a low-cost company. Federal authorities faced the problem faced by all economic regulators--what the economist Ludwig von Mises called the "calculation problem." [85] How can the right price and the right costs be identified in the absence of a market?

Regulators gave up on the idea of basing rural subsidies on historical costs,[86] as that rewards carriers whose high costs result from operational inefficiencies. Federal regulators have therefore opted for subsidy calculations based on "the forward-looking economic cost of developing and operating the network facility and functions used to provide services supported under section 254(c)(1) [of the 1996 act]."[87] Forward-looking cost approximates the costs that a hypothetical efficient carrier would incur in constructing and operating its network; those costs, minus a "revenue benchmark" taking account of all of a carrier's revenues, will determine the subsidy amount.[88] The FCC, working in tandem with the state utility commissions, will determine the forward-looking costs using a proxy cost model.[89]

The forward-looking cost model treats new entrants equitably in comparison with the historical cost model, [90] allowing new service providers to enter the local telephone market to overcome the legacy of the Bell monopoly.[91] But like all economic models, it is a very poor alternative to market mechanisms.[92] It does not solve the central problem posed by Mises.

Costs are notoriously difficult to determine and vary from place to place and time to time. Regulatory models use proxy costs, often taken from a "typical" case in a situation in which no case is, in fact, typical. Such proxy costs are bound to cause squabbles and misallocation of resources, both because the proxies themselves might be based on inaccurate cost determinations and because the models might be applied inappropriately. Superficially similar markets, seemingly requiring similar approaches for cost forecasting, can differ in subtle ways. The judgment calls inherent in applying cost models can cause significant market distortions when the models are actually applied.

Then there is the question of the general validity of the forward-looking cost models themselves. Since models are by definition simplified images of reality, it is always possible to criticize them for being simplistic or inaccurate. Such criticisms of forward-looking cost models were heard frequently during the life of the Joint Board and continue to air today.[93] Each of the several candidate models proffered so far also assumes the use of a different loop or switch technology in constructing the hypothetical network. [94]

Typically, the debate between supporters of competing cost models soon becomes politicized. Commercial firms use economic models all the time to help them allocate their funds, but when that approach is transferred to the public sector and *taxpayers'* or *ratepayers'* funds, lobbying and political clout soon take the place of rational strategic

discussion. Faced with the impossibility of setting prices by regulatory fiat, the FCC ultimately ducked the issue. The FCC will not chose a forward-looking cost model until October 1998, and the use of a model for rural carriers will not begin until at least January 1, 2001. By then few of the commissioners involved in the original universal service proceeding will be around to debate the outcome.

The FCC might be able to avoid the difficulties of cost models by using a market mechanism to determine the level of subsidies for telecommunications in high-cost areas. Under the competitive bidding plan proposed by GTE,[95] an auction would be held to decide who will provide universal service, with the lowest bidder getting the universal service subsidy. That would inject market forces into the universal service area. The FCC is sympathetic to subsidy auctions and will continue to explore the possibility of using bidding in the future.[96]

But the pseudomarket created by auctions is not a truly free market. In a free market, service quality is determined by consumer needs and requirements. By contrast, in a subsidy auction, service quality is determined by the level of subsidy. And it is not clear what the appropriate geographical area for the auction should be. Such problems are not without solutions [97] and are not unique to auctions. Indeed, they are common to any attempt to regulate the tradeoff between price and service quality. [98] But a market-based approach is not a free market, nor is it necessarily the best way to use free-market concepts as an evolutionary move toward a real free market.[99]

That observation is not intended to dismiss the GTE proposal or the willingness of the FCC to consider such a proposal, as both industry and regulators are constrained by the 1996 act, which clearly calls for the continuation--indeed the extension--of universal service as we have known it. But that bare political reality cannot conceal the universal service programs' incompatibility with free markets.

Why Subsidize Rural Telecommunications?

Scarcely anyone has addressed just why special telecommunications subsidies should be granted to those who live in high-cost areas. While many people living in rural areas have low incomes, many do not. Rural subsidies for telecommunications have never been based on the ability of subscribers to pay. So while poor farm workers in California and the inhabitants of rural trailer parks in Tennessee will get subsidized telephone service, so will wealthy horse farmers in Kentucky.

The point is not just that rural telephone subsidies are not even remotely targeted to low-income rural residents, let alone the truly needy. The issue is deeper: why is anyone living in a rural area entitled to phone service at others' expense? Rural areas are not only subsidized at levels enabling the same *service* quality to be supplied to them as to urban areas; the subsidy also guarantees that consumers will pay about the same *prices*. But why should rural areas--as a matter of national policy--have the same quality of telecommunications service as urban areas, if those who choose to live there are not willing to pay the costs? Why should the price of service in a high-cost area be the same as that in a low-cost area? The universal service debate supplies no answer to those questions.

Urban areas have many facilities that are not available in rural areas, many of them, like telephones, associated with the cultural and economic level of the population. Yet there is no movement to subsidize all such facilities. Many rural regions would benefit from a large bookstore, such as Barnes and Noble, to serve as both a bookstore and a community center, but no one seriously proposes a subsidy to make that possible. On the other hand, urban regions are faced with the many curses associated with congested and transient populations; no one suggests exporting those problems to rural areas. Housing usually costs less in rural areas; why should the renters or purchasers of expensive urban housing subsidize phone service for those who enjoy the low costs of rural living? Urban and rural regions simply are not the same, and there is no good reason why they should have the same quality of telecommunications.

Why do rural subsidies for telecommunications continue? The "nation-building" phase of this country's history has ended, so there is no longer any argument that the western frontier will be cut off absent federal intervention. We must conclude that support for subsidies for rural telephone service, which comes largely from lawmakers from rural states, reflects political realities, not economic justifications.

How Markets Defeat Network Effects

The "network effects" argument for subsidies to lower-income groups can also be used to justify subsidies to rural areas. If a network stops growing because it encounters a "high-cost" area, the argument goes, we should keep it growing with subsidies and enforced price averaging. But that application of "network effects" reasoning is also flawed. As with low-income users, the argument assumes that the benefits of being on the phone network would not be internalized by rural users. And it assumes that the features of an area that make it "high cost" are *fixed*. But in truth, such costs can be defeated by innovation and market forces (a corollary of this, discussed below, is that no one will have an incentive to innovate to defeat high costs under a price-regulated universal service regime).

Indeed, there is no reason to think that without universal service rural telecommunications would be particularly primitive. Supporters of rural subsidies sometimes leave the impression that, if it were not for subsidies, many rural users would have to drive to town to make a phone call. Sen. Byron Dorgan (D-N.D.) said recently that the FCC's decision to support universal service for only one phone line per household in rural areas was "consigning the economic future of rural areas to virtual oblivion."[100] It is true that abandonment of support for high-cost areas (as opposed to support for just one line) might raise the costs of local phone service substantially in some areas. For example, in Georgia, which along with New Jersey lost substantial high-cost support under changes in support mechanisms ordered by the 1996 act, [101] delay in setting up an intrastate universal service fund reportedly caused prices in some areas to increase from $8.00 to $40.00. [102] But a whole new industry aimed at supplying rural communications service is emerging to attack the high costs underlying such price increases.

Consider, for example, the work that is currently being carried out to provide rural communications using terrestrial wireless and--to a much more limited extent--satellite communications. Those technologies have much lower infrastructure costs than do regular cabled communications and are therefore well suited to low-density populations. While the bandwidths that can be supplied to individual subscribers using those technologies are typically much lower than can be supplied over terrestrial cable, they are more than adequate for most applications including conventional telephony and Internet access. And more advanced wireless and satellite services promise higher data rates in the future. Already, some of the fastest Internet access available is through Hughes DirectPC service, [103] which is currently on trial but is potentially just as available to rural as to urban subscribers.

The capability of such technologies to supply high data rate services to rural customers has been recognized for some time. For example, a report issued by the National Telecommunications and Information Administration in 1995 concluded that new wireless technology will be required to deliver advanced data and video services economically to the most isolated rural residents and businesses.[104]

For the time being, however, the market for telecommunications in rural areas is mainly voice oriented, and wireless technologies can fill that need, too. Cellular technology is already almost a viable alternative to regular voice service in terms of service quality. Evidence from other countries shows that where cellular service is priced low it is used as a substitute for wireline service even in urban areas. In Israel, for example, said to have the cheapest cell phone rates in the world, cell phones are now almost ubiquitous, with some people opting for cell phones instead of wired telephones.[105]

Conventional cellular is already a viable alternative to wireline telephones in some circumstances, and rural telephony will also benefit from the emergence of personal communications services (PCS). Those are really just a variation on the cellular theme that uses digital technology and smaller cells than do conventional analog cellular communications. In the past few years the FCC has auctioned off spectrum for PCS, and there are many services up and operating.[106]

Also, terrestrial wireless could be combined with satellite technology for rural applications. Scientific-Atlanta Inc. and Celcore Inc. have announced plans to market an integrated satellite and cellular wireless loop service for rural areas. That service will combine Scientific-Atlanta's Skylinx satellite telecommunications network and Celcore's cellular networks and will enable a local telephone network to be established in isolated regions without an investment in infrastructure. The local network would be connected to networks around the globe via satellite links. [107]

Although noncabled solutions to the rural telecommunications problem will probably predominate, innovative cabled solutions also hold promise. For example, a company called E/O Networks has proposed a scheme called "fiber-to-the-farm," [108] a fiber distribution system intended for rural telephone companies. Since 1995 this product has been in use by rural telephone companies in the Midwest and in Canada. It is capable of delivering video and data services as well as enhanced voice services over distances of up to 75 miles. E/O claims that the cost of its system is no greater than that of an equivalent copper system.

All of these technologies offer hope that there is an approach to rural telecommunications that is even more market oriented than GTE's auction proposal. There is a large rural market for telecommunications that could offer the opportunity for entrepreneurs to meet its needs using emerging communications technologies.

According to a study issued by the Rural Policy Research Institute, rural telecommunications technology is "critical" to the future of rural communities.[109] That study surveyed almost 1,000 residents and business executives in 20 Midwestern communities with 6,000 or fewer people. Residents of rural communities view the ability to use new communications technologies as key to the future growth of their economies, as well as to the delivery of community services considered integral to the quality of life, the report says. About 64 percent of respondents rated telecommunications as "important" or "very important" to economic growth. Almost 76 percent viewed telecommunications as "important" or "very important" for both educational and medical services.

Rural residents are not in principle completely committed to subsidies to meet their needs. [110] The study reported that rural residents and business owners said private-sector and market forces--not government ones--should drive telecom development. Rural residents also strongly agreed that costs of introducing new technologies should be borne by users of the technologies.

Should we then assume that where there are needs there must be subsidies to meet those needs? No. The leap to such a conclusion begs the question. A barefoot population is an opportunity for a shoe salesman--not a sign that the government should subsidize shoes. Surely, telecommunications needs of rural areas can be met through market forces. Entrepreneurs have certainly done a miraculous job of meeting the needs of many other niche markets.

Of course, that will most likely happen over the course of some years or so, just like the adoption of any other technology. That will offend people whose expectations are shaped by more utopian ideals and who prefer equality no matter what the injustice and no matter what the cost. But when it comes to technology, first isn't necessarily best--later developers have a chance to get the bugs out, lower the costs of development, and benefit from others' experiments in serving consumer demand.[111] And unrealistic expectations of instant equality do not constitute a serious criticism of markets. Markets never offer utopia; they merely work better than regulatory alternatives.

Discounts for Education

In implementing the 1996 act, the FCC mandated discounts ranging from 20 percent to 90 percent for telecommunications services to schools and libraries, the highest discounts going to the poorest districts and those in high-cost areas. The discounts cover Internet access and many other telecommunications services, [112] as well as equipment such as inside wiring, servers, and routers, [113] although the statute calls for subsidies only for service. To pay for that subsidy, the FCC asked telecommunications companies (and hence their customers) to raise an additional $2.25 billion per year for the universal service fund. In December 1997 the FCC reduced the amount to be spent in the first half of 1998 from $1 billion to $625 million, in response to congressional concern that the FCC's demands would force prices up.[114] In June of 1998 the FCC limited the amount of money to be spent in the third and fourth quarters of 1998 and the first and second quarters of 1999 to $325 million per quarter in response to legislators concerns that the fund was far larger than Congress had intended, and would force consumers' bills up.

Schools can no doubt find Internet connections quite valuable, but the absence of such connections is not as obviously burdensome as is the absence of a phone in a home. It is therefore harder to justify universal service policies for schools than for low-income families and rural dwellers.

Why should technology purchases get special subsidies when school books and other educational tools generally do not? If the government were to mandate that all publishers supply books to schools at discounted rates, there would be protests from both the left and the right, which would probably involve invocations of nothing less than the First Amendment.

Yet textbooks are of unquestioned usefulness in schools, whereas the educational impact of the Internet is questionable. Clinton's Committee of Advisers on Science and Technology has endorsed wiring of classrooms, but their main recommendation was to fund studies to determine which educational techniques actually work. The committee's chairman, David Shaw of D.E. Shaw & Co., said, "The reality is we haven't the faintest idea what really works in a classroom."[115] The Clinton administration, in the person of none other than the president himself, has claimed that more than 130 studies have shown that advanced technologies enhance education. However, recent experiences in the United Kingdom suggest that the Internet is a very useful supplement to other educational techniques for highly motivated students but may have far less impact on less motivated students.[116] Several recent studies suggest that Internet access may *increase* the gap between low and high-achieving students, because the resource is most eagerly used by white males. [117]

Universal service for schools reflects the view that the main problem with poor schools is that they need more money for facilities and teachers' salaries. But the expensive disaster with Kansas City schools shows that that idea is deeply flawed.[118] Under court order, the Kansas City school board was told to design a "money is no object" program to integrate the school system and raise the test scores of African-American students. The school district added computers everywhere, TV sets, CD players, television studios, and a robotics lab, among other things, and boasted a student-teacher ratio of 12 or 13 to 1. [119] But the test scores of the minority students the plan was intended to help did not rise.[120] More attention to hiring good teachers and firing bad ones would have made a greater difference.[121] Similar results have been reported in Sausalito. [122]

The FCC's former chairman, Reed Hundt, unconvinced by the skeptics, commented to a group of educators that the universal service rulemaking was the "greatest thing since sliced bread."[123] Hundt noted that he is frequently told that it is wrong to upgrade technology infrastructure in schools when some still have leaking roofs, but he said, "I refuse" to make the choice and claimed that "we can do both." Chairman Hundt's comments reveal an optimism that discounts the likelihood of failure and disregards costs to consumers. Such optimism assumes away the politics that bogs down bureaucracies, while also assuming that markets cannot succeed.

Regulatory optimists are, almost by definition, technological pessimists. Would they put so much effort into forcing service providers to subsidize schools if they believed that technological advances and a dynamic marketplace would adequately serve their needs? Clearly not. But entrepreneurs can and do serve educational markets.

Many companies provide hardware, software, and services for the distance-learning market. A number of backers of important new technologies initially targeted educational markets. For example, Starlight Networks, an early developer of video servers,[124] specifically targeted the educational market, affiliating itself with Jostens, a distribution company serving that market. Starlight Networks envisions that it will be able to leverage its position in the educational market into a strong position in the video entertainment and corporate video market.

Another example of an important communications technology that made its start in the educational market is cable modems, a way for cable companies (and some telephone companies) to provide very high-speed connections to the Internet and to other wide-area networks.[125] Today's cable modems are in fact based on the broadband modems used in so-called institutional networks that were built by cable television systems to serve public institutions in the communities in which they operated, usually as required by franchises negotiated with local government.

Private communications companies have made a strong commitment to providing technology to the educational sector, if only for public relations purposes. [126] Continental Cablesystems made a commitment to supply free cable modems to schools in areas that it serves. Microsoft and America Online, respectively the world's largest software house and Internet service provider, have each offered free Internet equipment to schools. Microsoft says that its offer has been

accepted by more than 5,000 institutions.[127] Then there is Apple, which based much of its early marketing strategy on giving computers to the schools. [128] Those examples demonstrate that private-sector firms stand ready to install educational technology out of self-interest and do not have to be forced or bribed to do so.

Although universal service funds are capped at the present time, political pressure from various special interests threatens to lift spending limits regardless of what markets can do. The educational subsidy poses the most acute danger, because of the emotional power of promoting pro-children or pro-education policies. Furthermore, telecommunications companies are seen as "deep" pockets readily exploitable for political ends (even though telephone consumers ultimately pay)--hence the proposals to use the money from spectrum auctions to fund educational television and Internet access for schools.[129] More important, the vague nature of the 1996 act, combined with real differences of opinion on such matters, has meant that there is no consensus on what level and type of technology is appropriate for schools and thus what level should be subsidized. For example, even the comments to the Joint Board from people who believed that there should be subsidies for educational telecommunications did not seem to agree on what data rates needed to be provided to the schools. Some advocated 56 kbps lines or ISDN; others pushed the bandwidth up to T1 (1.544 Mbps); still others wanted to go all the way to T3 (45 Mbps) lines. The act subsidizes services but leaves equipment purchases to local funding.

This confusion opens the gate to special interests. If a certain package of subsidized telecommunications services fails to live up to some standard for providing telecommunications services in schools, politically powerful teachers' and consumer advocate groups will immediately react by calling for more subsidies, even if the standard itself is the real cause of the problem. Access to the Web might be a genuine boon to students, but Internet advocates sometimes talk as if the absence of Web access is the number-one problem facing schools at the present time. When the cyberactivists discover that Johnny can't learn with a T1 line, their probable reaction will be to push for greater subsidies so that Johnny can get a T3 (45 Mbps) line. They will not ask whether Johnny can't learn because the information provided to him over the Internet is of little significance to him, or because his parents did not read to him when he was a young child. Education has such appeal, regardless of the actual causes of failures of government-run schools, that universal service programs for schools will probably grow, even if the programs are shown to be ineffectual and markets would supply what is needed on their own.

Are Universal Service Policies Bad for the Information Society?

Ironically, some policies specifically designed to promote information technology access for the so-called information have-nots almost certainly have the opposite effect. Because universal service has been set up to help narrowly defined groups at the expense of consumers as a whole, it defeats the rational development of the infrastructure for the information society of the future. Put simply, universal service regulation poses a threat to the stated goals of the supporters of universal service, namely the development of an advanced communications infrastructure for the United States.

Economic Distortion

Most obviously, funding universal service, especially in combination with enforced price averaging, distorts the telecommunications market. By definition, the funds consist of money that the telephone companies would have otherwise used some other way or in some other geographic area. In other words, because Congress and the administration direct funds to build infrastructure for favored groups, infrastructure will not be built for less favored groups who would be willing to *pay* to build that infrastructure and who would use it to generate wealth for themselves and for the rest of the economy.

As currently structured, the universal service programs contain a corporate welfare element, which should be attractive to nobody--except, of course, the businesses that benefit. For example, despite getting money from the universal service fund, Internet service providers (ISPs)do not have to contribute to it. The FCC took a great deal of heat for that decision from Sens. Stevens and Conrad Burns (R-Mont.); in response, the FCC has carefully explained that ISPs are "information service" providers and not "telecommunications service" providers--the former provide data manipulation and content, the latter, mere transmission. [130] That distinction harks back to much earlier FCC regulations that distinguished "basic" and "enhanced" services; it also recalls the category of "information services" recognized by the

Modification of Final Judgment Decree that bound the Bell Companies after the breakup of AT&T. While Congress might well have intended to preserve that distinction, it is nonetheless absurd. A distinction between "information" and "telecommunications" hardly belongs in a "technology neutral" legal regime, the legal regime that supposedly recognized that technology blurs distinctions between old legal categories.

Universal service price manipulations and price averaging distort competition. It makes little sense for ratepayers to subsidize two or more companies to compete against each other. But giving the subsidy only to one favored company makes it highly unlikely that a second company will ever want to compete with the favorite. In either case, holding prices artificially low in residential and rural markets makes those markets grossly unattractive to new entrants; unsurprisingly, the Baby Bells faced their first access competition in business markets, where prices are held higher to subsidize residential service. More generally, "universal service" regulations have again and again been used by older, established technologies as a reason for restricting the entry of new companies that might attack the incumbents' revenue streams.[131]

Adding insult to injury, universal service policies also give the federal government the power to bribe entire industries to comply with other questionable policies. Senator McCain, for example, proposed legislation that would require any company accepting federal funds to develop "key escrow" weaknesses in their encryption technology to enable police surveillance of encrypted messages. [132] Sen. Dan Coats (R-Ind.) sponsored S. 1619, which would require schools accepting universal service funds for Internet access to use controversial blocking software to limit students' access.[133]

Subsidizing the Status Quo

The relationship between subsidies and technology is very complex, and it is impossible to design a regulatory or industrial policy that will promote the "right" technologies.

Nonetheless, virtually everyone agrees that subsidies to promote the universal deployment of telecommunications services should be technology neutral, in the sense that no subsidy should favor a specific technology. For example, in the context of rural telecommunications, subsidies should not favor PCS over satellite, since satellite might be a superior solution to the problems of rural telecommunications. And subsidies should not favor the purchase of *services* (e.g., Centrex, a type of central office switching) over the purchase of *end-user equipment* (the Private Branch Exchange or PBX) that performs the same function.[134]

The desire for neutrality is, the FCC explains, why substantial amounts of equipment are eligible for the schools and libraries fund--to preserve equity between wireline providers and wireless providers. [135]

Since wireline service requires more equipment, such as inside wiring, than wireless, by definition, does, excluding equipment from the fund would have favored wireless over wireline technology. One wonders, however, if wireless is cheaper because it requires less equipment, whether discounting equipment does not in fact unfairly advantage wireline services.

The bottom line is that *any* universal service subsidy is likely to discourage innovation in wireless or any other new technology. Even forward-looking cost structures for subsidies, the approach being taken to both the universal service and interconnection aspects of the Telecommunications Act of 1996, rely on what we know *today* about technology. Anticipating the direction of new technologies is notoriously hard to do. The history of the communications industry abounds with stories about how new developments in technology have led to profound changes in the economics of telecommunications. Examples of such changes include

- the development of microwave transmission in the 1970s, which ultimately reduced the cost of entry into the long-distance telephone business and created an environment in which deregulation of the long-distance business became viable;
- the emergence of sophisticated digital compression technology in the 1980s, which allowed direct broadcasting satellites to carry hundreds of channels;[136]

the combination of graphical user interface and hypertext technologies to create the World Wide Web from a decades-old obscure research network known as the Internet, a relatively small development that created a global multimedia network.

In each of those cases new and mostly unexpected developments in technology reduced the cost of bringing new services to the consumer and helped satisfy pent-up demand for low-cost telecommunications services. For the most part such benefits were brought about without much in the way of government subsidy.[137] But to understand how subsidies might have made their impact felt, let us consider a thought experiment in which the government had decided to provide special subsidies for the multichannel digital television described in the second example.

For the sake of argument, suppose a subsidy for multichannel television was structured so that any service provider that offered more than, say, 200 channels would receive a certain subsidy. If the rules for awarding the subsidy merely mentioned the number of channels, rather than the manner in which that bandwidth should be supplied, it would, on the face of it, appear to be technology neutral.

However, suppose that there are two technologies--Technology A and Technology B--both capable of supplying more than 200 channels. Technology A is based on enhancements of the existing technology for delivering video entertainment. In fact, such a technology exists. For more than a decade, cable television companies have been replacing some of the coaxial cable in their trunking with fiber optics (mainly to improve the quality of the transmissions). The rest of the network remains exactly the same, but the extra capacity of the fiber is sufficient to bring more channels into the home than could previously installed coaxial cable.

In fact, this architecture is sufficient to bring to homes the 200 channels that are required to get the government subsidy--but barely. With this architecture, there is certainly no chance that one could upgrade the network to, say, 500 channels. In addition, those homes that are located a long way from the source of the video at the cable operator's "head end" may find that when the operator starts to offer the full 200 channels, video quality is quite poor. The cost of providing such an upgrade to a cable system would vary enormously depending on the size and geography of the network and the type of fiber optic system used. However, let us assume that system costs amount to $100 per subscriber.

Meanwhile another technology, Technology B, is being developed. That technology involves either satellite distribution of video or bringing fiber quite close to the home. In addition, digital compression may be used. Such a system would eliminate all the quality problems associated with Technology A and might also be capable of providing 500 channels or even thousands of channels. This is clearly not the place to discuss advanced cable television and satellite systems, but it is perhaps worth mentioning that such systems were being developed when cable operators were beginning to install simple Technology A-like fiber trunks, but the advanced systems are only becoming economical today.

Clearly, all else being equal, Technology B is preferable to technology A. But, of course, all else is not equal. Technology B is more expensive. At the time that Technology A is being deployed for $100 per home, Technology B may cost as much as $1,000 per home. However, its backers have a real hope that the cost can be reduced to a point where Technology B can compete with Technology A.

In a free market, let us assume, the hopes for Technology B will be realized if its cost can be pushed below $200 per home.[138] But it is not just a matter of achieving this price level; it is also a matter of doing it within a certain time frame. As a technology based on the existing infrastructure, Technology A has an inherent advantage in terms of industry knowledge--there is greater understanding of how it can be quickly installed and used within the industry community.

Once Technology A (in this case, analog fiber trunking) is installed, cable companies are less likely to want to start all over again with Technology B. Vendors of Technology B will have to offer cable companies special prices for Technology B to get those companies to buy.

The effect of a subsidy structured the way we explained it earlier can be quite devastating to Technology B. Suppose

that the government offers a $50 per subscriber subsidy to any technology that can provide 200 channels. That does not narrow the absolute gap between the two technologies, but it may make the cost of deploying Technology A so low that it will be almost universally deployed quite rapidly. The subsidy will not have much impact on Technology B, which will remain very expensive and will not be much more widely deployed than in a subsidyless environment. By the time Technology B catches up in terms of cost, there is likely to be so much of Technology A installed that the opportunities for Technology B's success are limited.

The above argument is based on the idea that subsidies to any technology will be fixed amounts. Subsidies based on percentages may be "fairer" to new technologies.[139] But by definition that means that they are no longer technology neutral.

Why be technology neutral in the first place? After all, if we know that Technology B is better, why not just subsidize Technology B from the start in order to get that superior technology deployed quicker? Unfortunately, the real world is not as simple as the example above, where we *assumed* that Technology B was superior to Technology A. In practice, as we noted earlier, it is hard to predict which technologies are going to succeed and when. Businesses have to make such judgments all the time, but when they do so the profits of the company and the careers of the judgment makers are on the line. Bureaucrats in charge of an industrial policy seldom have as much information or feel similar pressures.

In fact, governments trying to pick a winning technology usually back losers.[140] In the early 1980s, both the British and (especially) the French governments provided incentives for cable companies to deploy advanced networks that used video switches to bring many new television channels into homes on an experimental basis. Those switched-video trials turned out to be less than successful. For the most part, they led to the deployment of immature technology that did not work very well and that could not be cost justified once the subsidies were removed. In fact, at approximately the same time, a few similar trials were going on in the United States; they had similar results. But in the United States, the losers were shareholders in the telephone companies that ran the trials, not taxpayers.

Conclusion: The End of Universal Service

This study began by suggesting that universal service has been an important and growing part of U.S. telecommunications policy because of raw politics. There is really no rational or ethical way to justify the universal service programs:

- Even the very poor can afford telephone service if they make small changes to their monthly budget.
- Competition, not subsidies, is the best way to drive prices lower.
- Urban dwellers should not be obliged to subsidize rural phone users, any more than rural residents should be forced to subsidize urban rents.
- Technology and markets can defeat the factors that make rural areas "high cost."
- Price averaging and subsidies grossly distort competition.
- Universal service subsidies will often discourage the deployment of the best technology.

Universal service policy as currently proposed is futile or worse. In the short term, there is little likelihood of change. Even a purely free-market FCC would be limited by Congress, and Congress in the 1996 Telecommunications Act intended to give universal service quite broad scope.

Real change would have to come from Congress. Growing discontent with the practical effects of the 1996 Telecommunications Act may lead to its overhaul. Congress is already scrutinizing the act again.

What remains troubling is how little the FCC, Congress, and the Joint Board understand market mechanisms or trust them to reduce the need for universal service subsidies. But there seems little reason to think that, in a competitive market, companies could not or would not seek higher profits in high-cost areas by deploying technology that would reduce the costs of serving those areas. Only critical analysis of the philosophical assumptions behind the existing law will pave the way to a new and better--or dismantled--universal service policy.

Notes

1. The report of the House-Senate Conference Committee that put the final touches on the 1996 Telecommunications Act described it as a "pro-competitive, de-regulatory national policy framework." Peter W. Huber, Michael K. Kellogg, and John Thorne, *The Telecommunications Act of 1996: Special Report* (Boston: Little, Brown, 1996), p. 277, quoting the *Joint Explanatory Statement of the Committee of Conference*.

2. See, for example, *The Economic Report of the President* (Washington: Government Printing Office, 1996) p. 176. John Browning's famous piece "Universal Service (An Idea Whose Time Is Past)" begins with the statement, "This is the story of the noblest idea in the history of technology: universal service." John Browning, "Universal Service (An Idea Whose Time Is Past)," *Wired*, September 1994, p. 102. Browning concludes that "universal service brought America into the information age." He recommends that we move away from price regulation to a regime in which there is "access regulation [that] would force companies to offer services to all customers." That would include opening the network to competitors. Browning's formulation of universal service comes close to the idea of interconnection. Although his piece is clearly not a free-market solution, it was considered quite radical in its implications at the time.

3. See, for example, Progress and Freedom Foundation, *The Telecom Revolution, An American Opportunity* (Washington: Progress and Freedom Foundation, 1995), pp. 63-65; and Thomas J. Duesterberg and Kenneth Gordon, *Competition and Deregulation in Telecommunications: The Case for a New Paradigm* (Indianapolis: Hudson Institute, 1997).

4. Federal Communications Commission, "Report and Order in the Matter of Federal-State Joint Board on Universal Service," *F.C.C. Record* 12 (1997): 8776. Cited hereafter as "Report and Order."

5. The act requires the FCC to establish rules designed to enhance access, "to the extent technically feasible and economically reasonable," to advanced telecommunications and information services for elementary and secondary school classrooms and libraries. 47 U.S.C. §254(h)(2)(A).

6. The FCC expects the costs of data entry for applications mailed to the schools and libraries fund to be $1.2 million, up from last October's budget estimate of $430,000. "Budget Estimates for 'E-rate' Program Administration Go Up," *Telecommunications Reports*, February 9, 1998, p. 28.

7. The FCC will provide universal service support for all public and not-for-profit health care providers in rural areas.

8. Bell Atlantic, "Universal Service Non-germane Appropriations Rider," March 19, 1998, p. 1.

9. "Lawmakers Criticize FCC's 'Disproportionate' Focus on Schools and Libraries, Blocking InterLATA Services," *Telecommunications Reports*, March 9, 1998, p. 2; and "House Subcommittee Takes Keen Look at USF Implementation; FCC Accused of Levying Tax," *Telecommunications Reports*, March 2, 1998, p. 1. The CelPage case is now pending before the U.S. Court of Appeals for the Fifth Circuit (New Orleans) as *Texas Office of Public Utility Counsel et al. v. the FCC and USA* (consolidated cases starting at no. 97-60421).

10. The FCC first proposed creating three federal "corporations" to administer universal service, the highest paid officer of which would earn up to $200,000 per year. "Congress May Address Universal Service, Internet, TV Content," *Outlook 98*, January 1998, pp. 16-17. The General Accounting Office explained that the FCC cannot legally create those entities; Congress then passed legislation authorizing the FCC to create a single entity, which will abide by the federal pay scale, to administer universal service. "GAO Says FCC Violated Law in Ordering Creation of USF Administrative Entities," *Telecommunications Reports*, February 16, 1998, p. 12; and "Clinton Signs Appropriations Bill Requiring USF Overhaul," *Telecommunications Reports*, May 4, 1998, p. 49. As of this writing, the FCC proposes using a single entity, the existing Universal Service Administration Company (USAC), to administer all forms of universal service. Federal Communications Commission, *News: Common Carrier Action*, May 8, 1998, p. 1.

11. "Hill Wants FCC Report on E-rate 'Irregularities,'" *TR Daily*, May 8, 1998, p. 1.

12. The account here relies on the historical scholarship of Professor Milton Mueller of Syracuse University. See

Milton Mueller, *Universal Service: Competition, Interconnection, and Monopoly in the Making of the American Telephone System* (Cambridge, Mass.: MIT Press, 1997).

13. Ibid., pp. 92-95. Today, interconnection refers to the problem of whether new entrants into the local telephone service market can connect to the incumbent telephone company's facilities. Interconnection gives new entrants' customers the ability to make calls to customers of the local telephone companies. In Vail's day there were many small local telephone companies that the Bell System gradually swallowed up. That made the interconnection issue moot and created "universal service," in the sense that anyone could call anyone else because of the existence of one unified national network.

14. 47 U.S.C. § 151.

15. Mueller, p. 158.

16. Also, government programs such as the Rural Electrification Administration's loan program provided direct subsidies to rural telephone systems.

17. Mueller, p. 159. Despite the beginning of subsidy flows, phone penetration actually fell from 1953 to 1956. Federal Reserve Bank of Dallas, *1996 Annual Report: The Economy at Light Speed--Technology and Growth in the Information Age--And Beyond*, Insert Exhibit E.

18. Mueller, p. 160.

19. The Bell System monopoly was never geographically complete. There are still more than 1,000 local telephone companies, most quite tiny, serving rural areas. Some of those are owned by larger holding companies. GTE, the largest of the holding companies, is actually larger than any Bell Company, or was before the joining together of SBC and Pacific Telesis and NYNEX and Bell Atlantic.

20. However, the Bell System was quite unresponsive to the needs of computer users in the early days of computer networking, and its status as a "national treasure" led to conceit. Hence the title of a history of the Bell System written by a former vice president of AT&T: Alvin von Auw, *Heritage and Destiny: Reflections on the Bell System in Transition* (New York: Praeger, 1983).

21. See generally, John Thorne, Peter W. Huber, and Michael K. Kellogg, *Federal Broadband Law* (Boston: Little, Brown, 1995) § 12.

22. MFS is now part of WorldCom, and TCG was recently acquired by AT&T.

23. 47 U.S.C. §§ 254(b), (h).

24. 47 U.S.C. § 255.

25. 47 U.S.C. §§ 707, 714 (intended to "stimulate new technology development . . . promote employment and training," and "support universal services to underserved rural and urban areas"); 47 U.S.C. § 708 creates a National Education Technology Funding Corporation charged with funding the deployment of educational networks and technology.

26. For example, the education fund is to encourage the state to "distribute resources to assure equitable aid to all elementary schools and secondary schools in the state and achieve universal access to network technology." 47 U.S.C. § 709 (a)(C)(iii)(II).

27. The provision invites the FCC to speed the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing . . . price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment. 47 U.S.C. § 706(a).

28. "Cyber Activists and the Communications Revolution: Looking for Handouts on the I-Way," *Organization Trends*, July 1996, p. 3.

29. Ibid., p. 4.

30. Ibid., p. 3.

31. Ibid.

32. Robert H. Anderson et al., *Universal Access to E-mail: Feasibility and Societal Implications* (Santa Monica, Calif.: RAND, 1995). The RAND study conveniently failed to address the questions of what means should be used to achieve universal e-mail and who would pay for it.

33. Quoted in "The Emperor's New Clothes," *Electronic Learning*, May-June 1994, p. 32.

34. Jeff Ubois, "A Whole Ne(w)t World: The Republican Congress Stakes Its Claim to Cyberspace," *Digital Media*, February 10, 1995, pp. 3-4.

35. Quoted in Robert B. Gelman with Stanton McCandlish, *Protecting Yourself Online* (San Francisco: HarperEdge, 1998), p. 161.

36. "Notable & Quotable," *Wall Street Journal*, June 23, 1997, p. A14.

37. Huber, Kellogg, and Thorne, p. 55.

38. AT&T, for example, added a 4.9 percent charge as a line item on business customers' bills; a residential charge is expected to follow. MCI and Sprint will probably follow suit. Bell Atlantic Mobile has added a $.62 per line per month fee to customers' bills. Bell Atlantic, "Telephone Excise Tax Proposal," February 5, 1998, p. 1.

39. "At NASUCA Conference, Kennard Offers States 'Package Deal' on Universal Service," *Telecommunications Reports*, February 16, 1998, p. 4.

40. See "Congress Wants Answers on Costs Issues," *Telecommunications Reports*, January 12, 1998, p. 24. See also "'E-rate' Backers See Success in Launch of Program As FCC Cuts Funding Levels," *Telecommunications Reports*, December 22, 1997, p. 2.

41. "McCain Backs Bill That Would Link 'E-rate,' Telemedicine Funds to Access Charge Cuts," *Telecommunications Reports*, March 30, 1998, p. 3; and "Stephens Amends USF Language in Supplemental Funds Bill," *Telecommunications Reports*, March 30, 1998, p. 3.

42. "Rockefeller's Bill Would Require 'Full Disclosure' on IXC's Bills," *Telecommunications Reports*, April 6, 1998, p. 5.

43. See AT&T, "Telecommunications Briefing Paper #3: Universal Service," March 23, 1998, pp. 2-3.

44. A group of senators from Montana, Oregon, Washington, and Alaska, for example, opposed government plans to distribute $100 million in subsidies for computer research, because not enough of the funds would flow to their states. Sen. Ron Wyden (R-Ore.) says that represents "yet another widening of the gap between the technological haves and have-nots." Quoted in "Western Senators Oppose Next-Generation Internet Funding," *EDUCOM Edupage Mailing List*, June 8, 1997, p. 1.

45. Namely, Sen. Larry Pressler from South Dakota. Pressler was defeated in the 1996 election, and his place as committee chairman has now been taken by Sen. John McCain (R-Ariz.).

46. "Senators Warn Hundt Not to Introduce Universal Service Piecemeal," *Communications Today*, January 28, 1997,

p. 1.

47. Sen. Olympia Snowe (R-Maine), who sponsored the universal service provision requiring phone companies to give discounts to schools, libraries, and rural health facilities, said, "Knowledge is power . . . and critical to our success in expanding use of this technology is access, especially for public institutions." Quoted in Mary Deibel, "Bill Gives Everyone a Chance to Plug In," *Commercial Appeal*, February 3, 1996, p. 5A.

48. "Cyber Activists and the Communications Revolution," p. 1.

49. Not all people view information technology as good; some argue that it speeds up the pace of our lives to the point that the quality of our lives is severely distorted. See Jeremy Rifkin, *Time Wars: The Primary Conflict in Human History* (New York: Henry Holt, 1987) pp. 11, 13, 27. Others note that there is an important difference between "information" on a hard drive or on the Web and knowledge or wisdom. See Cliff Stoll, *Silicon Snake Oil: Second Thoughts on the Information Highway* (New York: Doubleday, 1995); Theodore Roszak, *The Cult of Information: A Neo-Luddite Treatise on High Tech, Artificial Intelligence, and the True Art of Thinking* (1986; reprint, Berkeley: University of California Press, 1994); and Bill McKibben, *The Age of Missing Information* (New York: Plume, 1993).

50. Sometimes even consumer advocates underestimate how inadequate rural telecommunications can be. A few years ago, Jeff Chester of the Center for Media Education and I debated those issues on a C-Span program. Our debate centered on how to bring the benefits of advanced telecommunications services to the economically and geographically "underprivileged." Near the end of the session, both Chester and I were effectively silenced when a caller from a rural region pointed out that far from being concerned with the most advanced services, all he wanted was to get rid of his party line. Party lines used to be common; they provide multiple parties with telephone service over a single line. If you pick up your phone when your neighbor is on the line, you hear his conversation.

51. "Beyond Poverty 1992: Table 1," http://census.gov/hhs/poverty/beyond/index.html.

52. That is not to say that more general welfare programs are justified or effective in themselves.

53. See Richard Klingler, *The New Information Industry: Regulatory Challenges and the First Amendment* (Washington: Brookings Institution Press, 1996) pp. 87-88; Progress and Freedom Foundation, p. 65; Duesterberg and Gordon, p. 62; *The Economic Report of the President*, p. 176; and "Economist Charges Congress, FCC with E-Rate 'Stealth Tax,'" *Telecommunications Reports*, February 23, 1998, p. 40.

54. 47 U.S.C. § 254(b)(1).

55. Telecommunications Industries Analysis Project, "Calculations and Sources for Revving up the Communications Economic Engine: Household Services, Monthly Bills, and Barriers to Competition," Cambridge, Mass., July 20, 1997, pp. 3, 7 (figures for telephone penetration are from November 1996; figures for television penetration are from 1994). Cited hereafter as "Calculations and Sources."

56. Federal-State Joint Board on Universal Service, "Recommended Decision," *F.C.C. Record* 12 (1996): 87, 151, ∂ 127. Cited hereafter as "Recommended Decision."

57. Ibid., p. 152, ∂ 125; and "Report and Order," pp. 8837-39, ∂ ∂110-13.

58. The board said (1) "subscribership levels do not address the second component of affordability, namely, whether paying the rates charged for services imposes a hardship for those who subscribe"; (2) "the scope of the local calling area directly and significantly impacts affordability" (because within limited local calling areas, subscribers may have to incur greater long-distance charges to reach an equivalent number of lines); and (3) "while a specific rate may be affordable to most customers in an affluent area, the same rate may not be affordable to lower income customers." "Recommended Decision," pp. 151-53, ∂ ∂127-29.

59. "Report and Order," p. 8842, ∂ 118.

60. 47 U.S.C. §§ 254(c)(1)(A)-(D).

61. "Recommended Decision," p. 148 n. 120.

62. "Report and Order," p. 8809, ∂ 61 ("all four criteria enumerated in section 254(c)(a) must be considered, but not each necessarily met. . . .").

63. The National Cable Television Association suggested basing eligibility on whether the consumer receives federal assistance from one of the four major assistance programs: Aid to Families with Dependent Children, Supplemental Security Income, Food Stamps, and Medicaid. The Florida Public Service Commission suggested providing support to people who receive an Earned Income Credit on their tax returns. "Recommended Decision," p. 297, ∂ 412.

64. Ibid., p. 303.

65. "Report and Order," p. 8973, ∂ 373.

66. The board's additions to the list of basic services that must be made available to low-income subscribers included toll limitation services, which limit the subscriber's long-distance calls. "Recommended Decision," p. 195, ∂ ∂385-86; and "Report and Order," p. 8821, ∂ 82. That is because low-income consumers often have their phones disconnected for running up unpaid long-distance bills. The FCC also created a federal fund to support Lifeline programs that reduce rates for low-income customers. Since 1985 there have been two such programs: the Lifeline Assistance program, which waives federal charges on monthly telephone bills and requires the same of the states, and the Lifeline Connection Assistance program (sometimes called Link Up), which provides federal support to reduce qualifying customers' initial connection charges by up to one-half. Under the new rules, all service providers capable of providing Lifeline service would contribute to the fund, and the funds would be available to consumers on a means-tested basis.

67. One plan to balance the budget had the U.S. Treasury lending against money from the universal service fund in 2001 and artificially decreasing distributions to telephone companies the following year. Jube Shiver Jr., "Budget Ax Poised over Phone Subsidies for Rural Areas," *Los Angeles Times*, July 24, 1997, p. D3. Whatever one may think of the universal service doctrine, it is unlikely that any lawmaker in the 104th Congress wanted to turn the universal service fund into another Social Security fund.

68. Buying local-only phone service was generally practically impossible. Mueller, p. 172.

69. "Calculations and Sources," p. 13 (data from March, 1996). See also "Recommended Decision," p. 299, ∂ 416.

70. "Calculations and Sources," pp. 17, 20, 24. A total of 8.5 percent of households with incomes under $10,000 have cellular phone service. Ibid., p. 21.

71. Ibid., p. 14. Thus for households with annual incomes from $7,500 to $9,999, the penetration rate is 87.2 percent; for those with incomes from $5,000 to $7,499, 83.1 percent; and for those with incomes from $10,000 to $12,499, 88.8 percent. Ibid. See also Industry Analysis Division, Federal Communications Commission, *Monitoring Report: Common Carrier Docket No. 87-339*, May 1995, p. 37. Cited hereafter as *Monitoring Report*.

72. "Recommended Decision," p. 196.

73. A survey of 14 low-income households in Camden, New Jersey, revealed that all 14 had a television. Nine, including four that did not have phone service, had cable television service. Four households that lacked phone service had cars. When asked whether telephone or television was more important to them, four chose television (none of them had phone service), six chose telephone (four had phone service), and the remaining four had no preference. *Monitoring Report*, p. 16. The higher penetration rate for phone service in the colder northern states suggests that residents of warmer climates are less likely to see phone service as essential. Ibid., p. 20.

74. Participants in the universal service debate hardly ever discuss the relationship between universal service subsidies and the behavior of telephone consumers. For example, the Joint Board recommended that phone companies no longer

be permitted to disconnect local service for failure to pay long-distance charges. Might that create an incentive for some people to run up huge long-distance bills, knowing that their local telephone service would not be disconnected?

75. "The Lifeline and Link Up Programs," p. 4, http://benton.org/Library/Recommend/programs.html; see also *Monitoring Report*, p. 16.

76. Universal service programs can increase penetration rates--at a price. Canada has more generous support for subsidies than does the United States, and its penetration rate is 98 percent. But Canada also has much higher long-distance rates, raising the question of whether the overall benefit is worth the cost. And its higher penetration rates might be partly due to the fact that penetration overall is higher in colder climates. Robert W. Crandall and Leonard Waverman, *Talk Is Cheap: The Promise of Regulatory Reform in North American Telecommunications* (Washington: Brookings Institution, 1995) pp. 36-37 n. 67. See also *Monitoring Report*, p. 20, showing that penetration in many northern states is 94.9 percent or higher; in many southern states, penetration is below 92.7 percent.

77. See Federal Reserve Bank of Dallas, Insert Exhibit E. Phones were invented in 1876 and took 35 years to spread to the first quarter of the population. Similarly, there is vigorous competition in the personal computer market; the personal computer took 15 years to spread to 25 percent of the population. "The Technology Culture," *Wall Street Journal*, June 16, 1997, p. R4. In this environment, the power of technology increases far faster than its cost. A computer chip in 1982 could execute only about one instruction per second and cost $360; a 1997 chip could execute 500 instructions per second but cost $1,000. Ibid.

78. Thorne, Huber, and Kellogg, p. 797. See also Federal Reserve Bank of Dallas, Insert Exhibit E.

79. Peter Pitsch, *The Innovation Age: A New Perspective on the Telecom Revolution* (Indianapolis: Hudson Institute, 1996), pp. 77-78.

80. See, for example, *The Economic Report of the President*, p. 176.

81. "Phone Plan Is Attracting Immigrants in New York," *New York Times*, March 18, 1996, p. B1.

82. Telecommunications Industries Analysis Project, "What Is the Price of Universal Service? Impact of Deaveraging Nationwide Urban/Rural Rates," Cambridge, Mass., 1993.

83. Wayne Leighton, "Telecommunications Subsidies: Reach Out and Fund Someone (Whether You Want to or Not)," Citizens for a Sound Economy Issues and Answers, January 5, 1995, p. 9.

84. "At Hearing, Merits of 'State-First,' '100% Federal' USFs Debated," *Telecommunications Reports*, March 9, 1998, p. 34.

85. See generally Ludwig von Mises, "Economic Calculation in the Socialist Commonwealth" (1920), translated and reprinted in *Collectivist Economic Planning*, ed. F. A. Hayek (London: George Routledge & Sons, 1935); and Ludwig von Mises, *Human Action* (New Haven, Conn.: Yale University Press, 1949). "At the bottom of many efforts to determine nonmarket prices is the confused and contradictory notion of real costs. If costs were a real thing; i.e., a quantity independent of personal value judgments and objectively discernible and measurable, it would be possible for a disinterested arbiter to determine their height and thus the correct price. There is no need to dwell any longer on the absurdity of this idea" (p. 393).

86. See Wayne Leighton, "What to Do about Universal Service Subsidies: Support for High-Cost Areas," Citizens for a Sound Economy, Issue Analysis no. 39, September 30, 1996, p. 4.

87. "Recommended Decision," p. 1184, ∂ 184.

88. "Report and Order," pp. 8880-81, ∂ 199-200, p. 8899, ∂ 224. The subsidy will mostly come from *state* funds; 25 percent will come from the federal universal service funds. Ibid., p. 8888, ∂ 201.

89. "Recommended Decision," p. 184, ∂ 184. Note that certain carriers will have the forward-looking approach phased in over a three-year period and will use a historical cost basis until then. A few carriers, primarily those in Alaska and those serving remote islands, will continue to use a historical-cost-based model.

90. See Leighton, "What to Do about Universal Service Subsidies," pp. 4-6, for an excellent description of the options available for forward-looking cost models.

91. Some analysts, however, worry that such regulation encourages weak competitors that merely resell existing services and could not exist without the protection of government regulation.

92. See James B. Ramsey, *Economic Forecasting: Models or Markets?* (London: Institute of Economic Affairs and Cato Institute, 1977) for a detailed analysis of this issue.

93. One of the best known of the forward-looking cost models is the Hatfield Model, which was developed by Hatfield Associates, Inc., under the sponsorship of AT&T and MCI. That model has been criticized by local telephone companies because it is constantly changing and contains algorithms that have not been made public, among other reasons. Consideration of each of the models has been hampered by errors and missing data. See "Report and Order," p. 136, ∂ 246.

94. See Ibid., pp. 8903-5, ∂ ∂233-37.

95. "Recommended Decision," p. 266, ∂ 342.

96. "Report and Order," pp. 8947-51, ∂ ∂319-25.

97. See Leighton, "What to Do about Universal Service Subsidies," pp. 8-14.

98. A good example is rate regulation of cable television service. Thorne, Huber, and Kellogg, § 6.

99. Peter K. Pitsch, "Reforming Universal Service: Competitive Bidding or Consumer Choice?" Cato Institute Briefing Paper no. 29, May 7, 1997.

100. "Lawmakers Criticize FCC's 'Disproportionate' Focus on Schools and Libraries, Blocking InterLATA Services," p. 2.

101. Federal Communications Commission, "Universal Service Support and Telephone Revenue by State," February, 1998, http://www.fcc.gov/ccb/states/streve96.zip.

102. "At NASUCA Conference, Kennard Offers States 'Package Deal' on Universal Service," p. 4.

103. This service uses the same small-dish technology used for direct broadcast services, but for the present, users need to buy separate equipment for television and Internet access. The current access rate using this technology for Internet access is around 400 kbps, but the potential for this technology is much higher. The digital television data stream supplied to homes using direct broadcasting operates at 6 Mbps.

104. See "NTIA Says That New Wireless Technology Needed for Rural NII Access," *Wireless Messaging Report* 3, no. 21 (October 24, 1995), electronic document.

105. See "Israel Spells Opportunity for Cellular Equipment Sales," *Mobile Phone News* 15, no. 14 (April 7, 1997), electronic document. Another important factor is whether the subscriber has to pay for airtime on incoming calls, as is the case in United States. In the United Kingdom, where cellular penetration rates are very high, the caller pays for airtime even if the call is made from a wireline phone.

106. The FCC delayed the advent of cellular technology for years. Its treatment of PCS has been better, though hampered by laws requiring that some of the PCS spectrum be reserved for small businesses. Some of those businesses could not pay for the spectrum, causing delay and confusion.

107. "Low-Cost Wireless Loop Provides Solution for Rural Telephony Problems," *Communications Today*, October 22, 1996, p. 1. This type of solution might be more desirable in less developed nations with no national infrastructure than in North America. However, the Joint Board considered in depth the so-called insular regions of the United States, where this type of technology may be appropriate.

108. "Fiber to the Farm: E/O Networks Begins Shipping Its Fiber to the Farm Product; Low-Cost Fiber Solution Now Available to Rural Customers," *Edge*, November 13, 1995, electronic document.

109. For a report of this study see "Rural Residents See Telecom as Key to Growth," *Telecommunications Reports* 621, no. 27 (July 10, 1995), electronic document.

110. In 1993 former senator Paul Tsongas told the National Telephone Cooperative Association in a keynote speech that his group--the Concord Coalition--was sympathetic to cuts in the rural telephone company loan program. Tsongas, who was generally well received, said, "The idea that your loan program is going to be there forever is an illusion . . . sooner or later in a crisis, it is going to go away." Quoted in "Tsongas Suggests End to Rural Support, Will Announce Zero-Deficit Budget," *Communications Daily* 13, no. 180 (September 17, 1993), electronic document.

111. Bill Gates with Nathan Myhrvold and Peter Rinearson, *The Road Ahead* (New York: Penguin Books, 1996), pp. 297-98.

112. Universal service funding for educational institutions will begin in 1998 and will go to K-12 schools with an endowment of less than $50 million, as well as their libraries.

113. "Application Guidance," http://www.slcfund.org/reference/471OReliglist.asp.

114. Ted Hearn, "FCC Cuts I-Net Funds for Schools, Libraries," *Multichannel News*, December 22, 1997, p. 14; and "'E-rate' Backers See Success in Launch of Program As FCC Cuts Funding Levels," *Telecommunications Reports*, December 22, 1997, p. 2.

115. Quoted in Amy Harmon, "Net Day Volunteers Back to Wire Schools for Internet," *CyberTimes*, October 25, 1997, electronic document.

116. John Authers, "Education's Hopes Fall through the Net," *Financial Times*, May 7, 1996, p. A19.

117. " "

118. Paul Ciotti, "Money and School Performance: Lessons from the Kansas City Desegregation Experiment," Cato Institute Policy Analysis no. 298, March 16, 1998.

119. Ibid., pp. 6, 7, 9.

120. Ibid., p. 16.

121. Ibid., p. 24.

122. Ibid., p. 25.

123. Quoted in "Notebook," *Communications Daily*, May 27, 1997, p. 3.

124. Video servers are a combination of hardware and software that provides for the effective storage and delivery of video clips, movies, and other forms of digitally stored video over a wide variety of networking types.

125. Cable modems potentially supply up to 10 Mbps access to the Internet, although 1-2 Mbps is more normal. This compares with today's leading-edge 56 kbps modems or 128 kbps ISDN modems.

126. Kevin Zimmerman, "In Schools, Cable Learns Its Lesson Well," *Multichannel News*, January 26, 1998, p. 30.

127. "Microsoft in K-12 Education," http://www.microsoft.com/education/k12.

128. See http://education.apple.com/education/power10.

129. The government sells licenses to use the electromagnetic spectrum, but it really has no legitimate claim to control of the spectrum. The federal government simply took control when it set up the Federal Radio Commission in 1927, displacing private owners. The value of the spectrum used by broadcasters, industrial radio, and other wireless operations is created by those private-sector actors, often at high cost and risk. See Lawrence Gasman, *Telecompetition: The Free Market Road to the Information Highway* (Washington: Cato Institute, 1994), chap. 4.

130. Federal Communications Commission, *Report to Congress*, April 10, 1998, http://www.fcc.gov/Bureaus/Common_Carrier/Reports/fcc98067.html.

131. See generally, Thorne, Huber, and Kellogg, § 12.

132. Solveig Bernstein, "Tangled Internet Encryption Intentions," *Washington Times*, July 19, 1997, p. C1.

133. "Senate Measure Would Limit Minors' Access to 'Cyberporn,'" *Congressional Quarterly*, March 14, 1998, p. 662.

134. Universal service as it currently exists creates distortions in the market because services are subsidized and taxed but equipment is not. See Michael A. Einhorn, "Recovering Network Subsidies without Distortion," Paper presented at "Universal Service in the New Electronic Environment" conference, Washington, October 15, 1993, p. 6.

135. Federal Communications Commission, *Report to Congress*.

136. There were earlier proposals for direct broadcast satellite systems using analog signal processing techniques, but those systems carried only a few channels and were uneconomic compared with conventional cable television; only the emergence of modern digital satellite broadcasting systems enabled satellite to compete effectively with cable. Digital compression also lies behind the current proposals for high-definition television systems.

137. The government did play a role, albeit accidentally, in the creation of the Internet. But it did so largely in its legitimate role as provider of national defense, not as a purveyor of subsidies. The World Wide Web was almost entirely created by private companies such as Netscape and Microsoft.

138. The cost of Technology B may not actually have to be the same as that of Technology A if it is superior in other ways. However, as a practical matter, in the telephone industry a very expensive technology will not be used outside of technical trials, even if it is vastly superior from a technical perspective.

139. The subsidies might instead be based on a percentage of the cost of the technology. A subsidy covering 50 percent of the cost of available technologies would appear to be "fairer" to new technologies. Thus, in our scenario, the cost of Technology A is reduced to $50 and that of Technology B is reduced to $500. The gap between the technologies is reduced from $900 to $450. That may go some way toward improving the likelihood that Technology B will be viable, although, as is the case with any type of subsidy, the exact impact will depend on the actual costs of deployment.

140. See, for example, Cynthia A. Belz, *High-Tech Maneuvers: Industrial Policy Lessons of HDTV* (Washington: AEI Press, 1991), p. 88.