CBO PAPER

FEDERAL SUBSIDIES OF ADVANCED TELECOMMUNICATIONS FOR SCHOOLS, LIBRARIES, AND HEALTH CARE PROVIDERS

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NOTE

Numbers may not add up to totals because of rounding.

PREFACE

The Telecommunications Act of 1996 directs the Federal Communications Commission (FCC) to include support for advanced telecommunications for elementary and secondary schools, public libraries, and nonprofit rural health care providers among the Universal Service Fund mandates. The Congressional Budget Office (CBO) estimates that the resulting subsidies will increase federal revenues and outlays by $560 million in fiscal year 1998 and $1.2 billion in fiscal year 1999. CBO assumes that revenues necessary to fund those activities will be collected as required and that the Universal Service Fund will be deficit neutral. CBO estimates that spending for subsidies for schools and libraries will remain below the $2.25 billion cap until after 2005.

This CBO paper presents estimates of federal revenues and outlays and outlines CBO's estimating methodology. In keeping with CBO's mission to provide impartial analysis, this paper contains no recommendations.

Philip Webre of CBO's Natural Resources and Commerce Division wrote the report under the supervision of Jan Paul Acton and Elliot Schwartz. The author appreciates the comments of Pete Fontaine, Rachel Forward, Pamela Greene, David Moore, and Marvin Phaup. Melissa Burman edited the manuscript. Angela Z. McCollough prepared the paper for publication. Laurie Brown prepared the electronic version for CBO's World Wide Web site.

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SUMMARY

In May 1997, pursuant to the Telecommunications Act of 1996, the Federal Communications Commission (FCC) issued a report and order detailing its plan for providing subsidies to elementary and secondary (K-12) schools, public libraries, and public and nonprofit rural health care providers through the Universal Service Fund (USF). In that order, the FCC laid out the terms and limits of its program to promote access to advanced telecommunications services—such as the Internet and computer networking—by those groups. Most notably, the FCC created a system of sliding-scale subsidies for schools and libraries that would average 60 percent of eligible expenses.

Collections and expenditures for those purposes are scheduled to begin in 1998. However, the details of the plan are still subject to change. The FCC issued an order on reconsideration modifying aspects of the plan late in December 1997, and more changes are likely to be made during 1998.

This paper presents the Congressional Budget Office's (CBO's) baseline estimates for federal outlays and revenues under the FCC's May 1997 plan to provide those federal subsidies. CBO estimates that outlays would rise from about $0.6 billion in fiscal year 1998 to $1.2 billion in 1999. After that, outlays are expected to increase by a little more than $0.1 billion per year, reaching $2.4 billion in 2008 (see Summary Table 1). CBO assumes that revenues necessary to fund those expenditures will be collected as required and that the USF will be deficit neutral on a fiscal year basis.

Universal Service and the Telecommunications Act of 1996

U.S. telecommunications policy has long used a complicated and implicit system of transferring costs (and, thus, income) among various groups of telecommunications customers in order to promote "universal service"—the highest level of telephone connectivity by individuals. Typically, telephone companies charge urban and business users more than their share of costs to help offset the costs of providing service to rural and residential customers. Similarly, the price of long distance service exceeds its cost, with the difference used to subsidize local telephone service. That policy is based in part on the idea that the telephone network becomes more valuable as more people are connected to it, and in part on notions of equity. Before the 1996 act, most of those transfers (or subsidies) occurred outside government funding mechanisms, in the form of regulated telephone rates and intercarrier charges.

The Telecommunications Act of 1996 converts many of the implicit subsidies into explicit fees and payments. CBO and the Office of Management and Budget

SUMMARY TABLE 1. ESTIMATED SUBSIDIES FOR ADVANCED TELECOMMUNICATIONS FOR K-12 SCHOOLS, PUBLIC LIBRARIES, AND SELECTED RURAL HEALTH CARE PROVIDERS
(By fiscal year, outlays in millions of dollars)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
K-12 Schools	478	1,019	1,453	1,548	1,641	1,738	1,843	1,953	2,072	2,195[a]	2,250[a]	18,188[a]
Libraries	61	127	129	132	135	138	141	144	148	151[a]	154[a]	1,462[a]
Subtotal	539	1,145	1,583	1,680	1,776	1,876	1,984	2,098	2,219	2,250[a]	2,250[a]	19,400[a]
Rural Health Care Providers	25	48	74	97	120	142	152	163	174	173	173	1,342
Total	564	1,194	1,657	1,777	1,896	2,018	2,136	2,261	2,393	2,423[a]	2,423[a]	20,742[a]

SOURCE: Congressional Budget Office.

a. The sum of outlays for schools and libraries is capped at $2.25 billion in any single year. Individual components may be reduced to bring that total into line. Consequently, totals may not add.

have interpreted the language of the act to mean that those fees and payments should be counted in the federal budget because they are mandated by the federal government. Recording those transactions as budgetary cash flows has substantially expanded the existing budget account for universal service. In accordance with that interpretation of the law, CBO and the Administration count payments into the Universal Service Fund as federal revenues and payments from the fund as federal outlays.

Section 254 of the Telecommunications Act of 1996 codifies the principles of universal service and sets out general guidelines for the FCC to carry out this policy. The act also calls on the FCC to establish a system to support advanced telecommunications for schools, libraries, and selected rural health care providers. The FCC report and order establishes subsidy payments, in the form of a discount, for advanced telecommunications. Funds for those subsidies will come from charges imposed on telecommunications carriers. Those carriers, in turn, will attempt to recover the funds by charging users more, as they do with current universal service subsidies. The subsidy, averaging roughly 60 percent of allowed expenses for schools and libraries, is limited to $2.25 billion per year. In addition, the order specifies that selected rural health care providers may receive subsidies on distance-related telecommunications charges, up to a total limit of $400 million per year. The subsidies for all groups start January 1, 1998, although the actual disbursements of funds might be delayed. CBO's estimates of the Universal Service Fund payments for those services are well below the relevant caps for the first few years.

Federal Outlays and Revenues

CBO estimates that providing subsidies for schools and libraries will result in $539 million in federal outlays in fiscal year 1998, rising to $2.25 billion in 2008. Providing subsidies to rural health care providers will yield an estimated $25 million in federal outlays during 1998 and $173 million by 2008 (see Summary Table 1). CBO assumes that outlays will generally equal revenues over that period. In late December 1997, the FCC modified the collection requirements to ensure that the fund would remain deficit neutral in 1998.

Because the federal subsidy reduces the cost of a whole advanced telecommunications system by only a fraction—in many instances, a small fraction—the willingness of schools, libraries, and medical providers to increase their overall spending on advanced telecommunications systems in response to the subsidy will largely determine federal outlays.

Subsidies for Schools and Libraries

The FCC order states that K-12 schools—all public and most private—and public libraries are eligible for federally mandated discounts from telecommunications carriers and other suppliers for a wide array of telecommunications services. In turn, the USF would pay firms the amount of the discount, or the firms could count that discount against contributions they owed the USF. The FCC states in its order and report that a company does not have to be a regulated telecommunications carrier to receive USF payments and expects that combinations of regulated and unregulated companies will bid to provide packages of services to schools. Because the intent is to subsidize the activity and not the institution, schools and libraries cannot resell the services on which they receive subsidies.

The FCC order covers advanced telecommunications services and equipment directly related to connecting to networks that provide those services both within the schools and with the outside world, but it does not cover services and equipment related to content or presentation to students and other users. Thus, the subsidies would be available for wiring necessary to connect classrooms, but they would not cover the computers used by the students in the classrooms. The subsidies will apply not only to computer communications, such as access to the Internet, but also to cable and satellite television and voice telephony. The FCC order is intended to provide advanced telecommunications to school classrooms and libraries in a technology-neutral manner. Consequently, it does not specify what type of technology schools must use and to what use such technology must be put.

For schools, the subsidies are expected to average around 60 percent of eligible expenses, but they will range from 20 percent to 90 percent. Higher subsidies will be provided to poorer school districts, with the rate determined by the number of students eligible for subsidized school lunches.

Subsidies for Nonprofit Rural Health Care Providers

Consistent with the larger universal service policy, the subsidy for rural health care providers will reduce the differential in the cost of using advanced telecommunications for medical purposes between rural areas and urban areas, applying only to the distance-related charges. The subsidies will be available for telecommunications involving direct patient care and administrative matters related to patient care or public health. Payments to individual health care providers are capped at a certain level of service, in addition to the total cap. The subsidies will also provide toll-free access to an Internet service provider for those health care providers who lack it.

INTRODUCTION

This paper presents the Congressional Budget Office's (CBO's) baseline estimates of federal outlays from and revenues to the Universal Service Fund to provide federal subsidies for advanced telecommunications services—such as access to the Internet and computer networking—to elementary and secondary (K-12) schools, public libraries, and public and nonprofit rural health care providers. The estimates are based on policies outlined in a May 1997 report and order issued by the Federal Communications Commission (FCC), but they also reflect the recent modifications of that plan adopted by the commission.

THE UNIVERSAL SERVICE FUND AND THE FEDERAL BUDGET

U.S. telecommunications policy has long used a complicated and implicit system of transferring costs (and, thus, income) among various groups of telecommunications customers in order to promote the highest level of telephone connectivity by individuals, often called universal service. Typically, telephone companies charge users of long distance and businesses more than their share of costs so that rural and residential users may be charged less. That practice is based in part on the idea that the telephone network becomes more valuable to all users as more people are connected to it, and in part on notions of equity. Before the Telecommunications Act of 1996, only a small fraction of those transfers were recorded on the budgets of federal and state governments. Most of the transfers (or subsidies) occur outside government funding mechanisms through the rates that regulated telephone companies charge their customers and through intercarrier charges.

The Telecommunications Act of 1996 converts many of the implicit subsidies into explicit fees and payments. The act also expands the definition of universal service to include subsidies for advanced telecommunications to schools and classrooms, public libraries, and rural health care providers. It requires all interstate telecommunications providers to contribute to an expanded Universal Service Fund (USF) that funds both the traditional type of transfers and the new, expanded ones.

CBO and the Office of Management and Budget (OMB) count payments into the Universal Service Fund as federal revenues and payments from the fund as federal outlays. Both agencies have interpreted the Telecommunications Act of 1996 to mean that the fund's expenditures should be part of the federal budget, because the transfers of income between various classes of telephone users would not occur but for the exercise of the sovereign power of the federal government. Furthermore, portions of the Universal Service Fund, most notably its Lifeline and Linkup Programs, have already been included in the federal budget.

CBO's and OMB's estimates of fund expenditures will shift over time as the FCC writes the rules fine-tuning the income transfers to and from the USF. Those estimates may also change substantially if the FCC revises its methodology for determining the costs of providing service to rural and other high-cost areas and for allocating those costs to the various providers of telecommunications services. Parts of the 1996 law are also being contested in court.

Section 254 of the Telecommunications Act of 1996 codifies the principles of universal service and sets out general guidelines for the FCC to carry out that policy. The law requires that high-quality telecommunications service be available and affordable throughout the nation, despite large differences in the cost of providing such service to different classes of customers in different regions of the country. Likewise, low-income people would continue to have subsidized service. Section 254 also provides for collecting contributions from telecommunications providers to defray the costs of such access. (Box 1 presents an overview of universal service, of which the advanced telecommunications subsidies are only a small part.)

Subsection (h) of section 254 outlines a policy of ensuring that schools, public libraries, and selected rural health care providers have access to advanced telecommunications. Specifically, the section provides that schools and libraries receive advanced telecommunications services at a discount from conventional rates and that rural health care providers have to pay only equivalent urban rates. In both instances, those charges would be less than what they would be in the absence of federal law, with the difference coming from the Universal Service Fund.

FEDERAL OUTLAYS FOR ADVANCED TELECOMMUNICATIONS SUBSIDIES OF THE UNIVERSAL SERVICE FUND

In May 1997, the FCC issued a report and order detailing its plan for providing subsidies from the Universal Service Fund to schools, libraries, and selected rural health care providers.[1] The subsidy on advanced telecommunications would be in the form of a discount, averaging 60 percent of eligible expenses for schools and libraries, and would be limited to $2.25 billion per year. Selected rural health care providers could receive subsidies on distance-related telecommunications charges, but the order limited such payments to $400 million per year. The subsidies for all groups would start January 1, 1998, although the actual disbursements of funds might be delayed.

1. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, FCC 97-157 (adopted May 7, 1997).

BOX 1.
OVERVIEW OF UNIVERSAL SERVICE

Universal service has come to mean the current system of redistributing costs associated with local and residential telephone service to long-distance and business customers, with the intent of increasing the percentage of the population that has telephone service. Currently, universal service is provided in two ways. The first is the way the Federal Communications Commission (FCC) and state regulators allow telephone companies to set telephone rates. Those rates allow various types of hidden subsidies to flow to local telephone companies from other local telephone companies and long-distance carriers. Telephone companies also subsidize their high-cost customers internally by charging high- and low-cost customers approximately the same rates, so that the excess amount paid by low-cost customers makes up for any shortfall in providing service to the high-cost customers. The second way is through the Universal Service Fund (USF), which collects revenue from telecommunications carriers and disburses funds for specific services. The Telecommunications Act of 1996 will transform many of the formerly implicit types of inter- and intracompany subsidies into explicit programs of the Universal Service Fund. It will also add to the number of specific services that are funded in that way.

The Universal Service Fund contains four main programs, in addition to the educational and medical subsidies that are the subject of this paper. The largest program provides subsidies for rural high-cost and insular areas. That High Cost Program accounted for $800 million of the $1 billion in outlays recorded by the Treasury for the Universal Service Fund in 1997. The Lifeline Program, begun in 1985, provides subsidies to low-income customers to pay their monthly telephone bill. The Linkup Program, begun in 1987, provides subsidies to the same group to connect to the telephone network. The fourth program funds telecommunications relay service for the hearing impaired.

All interstate telecommunications carriers will be required to contribute to the Universal Service Fund, out of which payments for existing universal service programs will be made. The fund will also finance additional activities, such as those for advanced telecommunications for schools and libraries. As the new provisions are put into place, the Congressional Budget Office projects that receipts and outlays from the fund will rise from $1 billion in 1997 to about $14 billion by 2007. A large part of the growth comes from converting the implicit cross-subsidies into explicit programs of the USF; thus, support for the high-cost areas will account for four-fifths of the increase. By contrast, the education and medical subsidies together account for only 17 percent of the projected total in 2008.

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1. The High Cost Program has several components that are beyond the range of this paper.

CBO estimates that providing subsidies for schools and libraries will result in $539 million in federal outlays in fiscal year 1998, rising to $2.25 billion in 2008. Subsidizing rural health care providers will result in $25 million in federal outlays in 1998, growing to $173 million by 2008. The education and libraries fund will reach the cap of $2.25 billion starting in 2007 (see Table 1). CBO has no way of allocating the reductions necessary to stay below the cap between schools and libraries. Consequently, the estimates presented for 2007 and 2008 for those categories individually are probably too high.

Schools and Public Libraries

K-12 schools and public libraries are eligible for federally mandated discounts from carriers and providers for a wide array of telecommunications services. In turn, firms that provide such a discount would be paid from the USF for the amount of the discount or would be allowed to count the discount against contributions they might be required to make into the USF. The FCC states in its report that a company does not have to be a regulated telecommunications carrier to receive Universal Service Fund payments; it expects that regulated and unregulated companies will bid to provide packages of services to schools. Because the intent is to subsidize the activity and not the institution, schools and libraries cannot resell the services for which they receive subsidies. Furthermore, private schools with endowments over $50 million are not eligible for the subsidies, nor are for-profit schools generally.

Eligible Services and Expenses. Eligible services include both external connections, such as access to the Internet, and internal telecommunications connections, such as local area computer networks connecting individual classrooms.[2] The FCC interprets the act's reference to "classroom" access to advanced telecommunications to mean that facilities and services connecting individual classrooms would be eligible. Generally, connectivity would be eligible; content or presentation would not. Thus, the FCC would fund the wiring necessary to connect classrooms but would not cover the computers used by the students in the classrooms. Although access to the Internet would be eligible, a service with proprietary content, such as America Online or CompuServe, would not be subsidized.[3] Table 2 lists the major categories of advanced telecommunications expenses and indicates whether they are covered by

2. Asbestos removal for the purpose of installing a computer network would not be eligible for subsidies. Making it eligible would cause a bias against wireless solutions. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (May 7, 1997), para. 460.

3. To the extent to which content companies also provide connections, they would be eligible to bid on the discount. But the Universal Service Fund would subsidize only the connectivity portion, not the entire bid of such a company.

TABLE 1. ESTIMATED SUBSIDIES FOR ADVANCED TELECOMMUNICATIONS FOR K-12 SCHOOLS, PUBLIC LIBRARIES, AND SELECTED RURAL HEALTH CARE PROVIDERS (By fiscal year, outlays in millions of dollars)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
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Total	564	1,194	1,657	1,777	1,896	2,018	2,136	2,261	2,393	2,423[a]	2,423[a]	20,742[a]

SOURCE: Congressional Budget Office.

a. The sum of outlays for schools and libraries is capped at $2.25 billion in any single year. Individual components may be reduced to bring that total into line. Consequently, totals may not add.

TABLE 2. ADVANCED TELECOMMUNICATIONS EXPENSES AND ELIGIBILITY FOR SUBSIDY FROM THE UNIVERSAL SERVICE FUND

Service	Examples	General Eligibility	Recent Spending by Public Schools (Millions of dollars)
Data Communications			5,200
Network hardware	File servers	Yes	800
Nonnetwork hardware	Computers for students	No	n.a.
Training and support	Software instruction	No	n.a.
Distance Learning			250
Production equipment	Recording studios	No	n.a.
Content	Taping shows	No	n.a.
Transmission	Satellite transmission	Yes	100
Internet and Online Services			90
Hardware connection	Telephone line to Internet	Yes	n.a.
Access only	Service provider	Yes	n.a.
Proprietary content	Specialized databases	No	n.a.
Conventional Telephony	Office telephone	Yes	525

SOURCE: Congressional Budget Office based on CCA Consulting, *Network Hardware Market*, (South Natick, Mass.: CCA, 1996); Hezel Associates, *Market Study: Video Communications Systems* (Syracuse, N.Y.: Hezel Associates, no date); Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, FCC 97-157 (adopted May 7, 1997), para. 531, footnote 1386; Quality Education Data, *1997-1998 Technology Purchasing Forecast* (Denver, Colo.: QED 1997).

NOTE: n.a. = not available separately.

USF subsidies. For comparison, the table also presents recent school spending for telecommunications.

The FCC order is intended to provide advanced telecommunications to school classrooms and libraries in a technology-neutral manner. Consequently, it does not specify what type of technology schools must use and to what use such technology must be put. The subsidies will apply not only to data communications but also to cable or satellite video communications and wireless or conventional telephony. Eligible services must be used exclusively for educational purposes.

Financial Arrangements. Not all schools and libraries will receive the same level of subsidy. The subsidies will range from 20 percent to 90 percent, depending on location and income status of the student body, with rural schools and schools serving poorer communities receiving larger subsidies. In an effort to ensure more equitable access to technology, schools will be placed in a subsidy category based on the percentage of students eligible for the national school lunch program (see Table 3). As that share rises, so will the subsidy; at the extreme, a school serving the poorest children will receive 4.5 times the subsidy rate of a school serving upper-income children. Libraries would use the rates of the surrounding district's public schools.

The FCC caps federal payments for subsidies for schools and libraries at $2.25 billion per calendar year. If the cap is approached, the fund administrator will give priority to schools serving disadvantaged communities and schools that did not previously receive Universal Service Fund subsidies. The fund administrator may hold over any surplus in the fund for any year, to be spent over the next two years. In order to account for the uncertain response of schools to this new program, the FCC ordered the fund administrator to collect as much as required by the demand for subsidies, but no more than $625 million for the first six months of calendar year 1998.[4]

To be eligible for the subsidized discounts, the schools and libraries would go through a bidding process for packages of telecommunications services. In their bids, carriers must offer schools and libraries prices no higher than they would offer to similarly situated nonresidential customers for similar services. (Regulated carriers must make their services available to all eligible customers within any geographic area they serve.) Generally, the school or library would buy the service and pay the discounted price. The Universal Service Fund would then pay the difference. The discount level must be approved in advance, and the school or library has to apply to the fund administrator no earlier than July 1 of the preceding

4. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (Third Order on Reconsideration, December 16, 1997).

TABLE 3. DISCOUNT LEVELS FOR DIFFERENT TYPES OF SCHOOLS AND LIBRARIES

Percentage of the School's Students Eligible for National School Lunch Program	Estimated Percentage of U.S. Schools in Category	Discount Level (Percent)	
		Urban	Rural
Less than 1	3	20	25
1-19	31	40	50
20-34	19	50	60
35-49	15	60	70
50-74	16	80	80
75-100	16	90	90

SOURCE: Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, FCC 97-157 (adopted May 7, 1997), para. 520.

calendar year.[5] The fund will operate on a calendar year, rather than school year or fiscal year, basis.

Rural Nonprofit Health Care Providers

The intent of the law in the case of rural nonprofit health care providers is to ensure that their cost for advanced telecommunications services is equivalent to what their urban colleagues would pay. This policy is consistent with the wider universal service policy that averages the rates between higher- and lower-cost customers. As with schools and libraries, the subsidy payment goes to the advanced telecommunications provider, not to the health care provider. The health care provider benefits by paying lower rates.

The act lists the types of rural health care providers that are eligible for subsidies. They are:

- Postsecondary educational institutions offering health care instruction, teaching hospitals, and medical schools;

5. The intent of the prohibition on advance booking of discounts is to ensure that schools with richer and more predictable income streams are not able to tie up the funds for years at a time. For the initial year, applications are not scheduled to begin until early 1998.

- Community or migrant health care centers;
- Local health departments or agencies;
- Community mental health centers;
- Not-for-profit hospitals;
- Rural health clinics; and
- Consortia of the above.

The FCC order specifies that the advanced telecommunications services eligible for subsidy need not be connected directly to individual patient care.[6] Eligible services may include those used for general administrative matters, as long as they are reasonably related to providing health services or medical education.

The mechanism for subsidizing eligible rural health care providers is similar to that for schools and libraries, but the types of spending eligible for subsidization are different. The subsidy is not to be applied to the entire cost of the services. Rather, rural health care providers are to be subsidized only for the charges that increase their rates above those charged to urban health care providers. A rural provider may receive support for the difference between the rural and urban rates in the base monthly charge, as well as any distance component of the service charge. Since long-distance charges on conventional telephone calls do not have a distance-related component—that is, the long-distance charge is the same whether the call is to a party 200 or 2,000 miles away—those charges would not be covered.

The program has a per-recipient cap. Each eligible health care provider can receive USF subsidies as long as the service being subsidized uses a line capable of transmitting no more than 1.5 million bits per second, commonly called a T-1 line.[7]

The act caps spending in that category at $400 million annually. The cap is sufficiently generous to permit each of the 12,000 eligible rural health care providers to pay for the distance-related cost of a T-1 line. Of course, they would still be required to pay the urban rate for the T-1 line as well as for the equipment needed to make full use of the T-1 line, both of which are substantial expenses. The FCC has

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6. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (May 7, 1997), para. 617 through para. 619.

7. A bit is a zero or one in the digital language of computers. A health care provider can use a T-1 line for transmitting medical images and records rapidly to specialists or for connecting to the Internet.

directed the Universal Service Fund administrator to collect as much as required by the demand for subsidies, but no more than $25 million per quarter for the first two quarters of 1998.[8]

BASIS FOR CBO'S ESTIMATES OF OUTLAYS AND REVENUES

Although the FCC has set up a mechanism to provide annual subsidies of up to $2.6 billion, the actual level of federal payments is only partly determined by federal action. Because the federal subsidy reduces the cost of an entire advanced telecommunications system by only a fraction—in many instances, a small fraction—the willingness of schools, libraries, and medical providers to increase their overall spending on advanced telecommunications systems in response to the subsidy will determine federal outlays.

Assumptions and Methods for Estimating Federal Payments Associated with K-12 Schools

CBO's estimate starts with current spending by public schools in four eligible categories. CBO then adjusts projections of public school spending upward to account for private schools. Future increases in that eligible spending are projected using the National Center for Educational Statistics's forecast for overall growth in K-12 educational budgets. CBO models the change in school expenditures that would be stimulated by the subsidy and applies the average subsidy (60 percent) to the adjusted projections in each of the categories of eligible spending to estimate federal payments through the USF.

Public School Spending on Advanced Telecommunications. CBO estimates that public schools spent $1.6 billion on eligible hardware and services during the 1996-1997 school year. The four categories of school purchases eligible for subsidies are:

- Hardware for local computer networks for internal connections, including installation;
- Internet services;
- The connectivity portion of distance learning; and

8. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (Third Order on Reconsideration, December 16, 1997).

- Conventional telephony.[9]

CBO estimates that public schools currently spend about $800 million per year for network hardware (see Table 4). For school spending on the specific goods and services eligible for the subsidies, CBO relied on private market analyses and data since scant federal data are available. CCA Consulting, a private market study firm, forecast that public K-12 schools would spend $680 million for network hardware in the 1996-1997 school year.[10] That estimate included major hardware components, such as bridges, routers, and hubs, but excluded amounts for wiring and the labor to install it. Assuming that wiring added another 15 percent to 20 percent to the cost, the overall costs of hardware for public K-12 schools would be $780 million to $820 million for 1996-1997.

CBO estimates that $70 million of school spending for Internet services that year would be eligible for a subsidy. A survey by Quality Educational Data (QED) of public K-12 schools revealed that schools spent $92 million for on-line services.[11] Many of those services, however, have proprietary content that the FCC has said would not be eligible for a subsidy. Accordingly, CBO has reduced the QED estimate by about $20 million to account for ineligible content features.

Distance learning includes acquisition or development of content, transmission, and hardware for closed-circuit video education. However, content and most hardware will not be subsidized. CBO estimates that between transmission and eligible hardware, the remaining costs for distance learning that are eligible for subsidies will not exceed $100 million. The few studies that CBO was able to find put the transmission portion of those costs at less than $50 million to $70 million.[12] The costs for eligible hardware (satellite dishes and other equipment necessary for television transmission) could add another $30 million to $50 million.

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9. The first two are needed for data communications and are part of computer systems.

10. CCA Consulting, *Network Hardware Market* (South Natick, Mass.: CCA, 1996). Other market surveys that CBO has found are broader in that they include things in the definition of network that the FCC would not cover, such as client computers and training.

11. Computed from Quality Education Data, *1997-1998 Technology Purchasing Forecast* (Denver, Colo.: QED, 1997), pp. 4, 11, and 17.

12. Hezel Associates, *Market Study: Video Communications Systems* (Syracuse, N.Y.: Hezel Associates, no date); for example, Hezel estimated the cost of transport at $74 million for K-12 spending on distance learning.

TABLE 4. ESTIMATED PUBLIC SCHOOL SPENDING ON ELIGIBLE ADVANCED TELECOMMUNICATIONS TECHNOLOGY FOR SCHOOL YEAR 1996-1997

Category	Examples	Estimated Spending (Millions of dollars)
Network Hardware	File servers, routers, wiring	780-820[a]
Internet Services	Access fees	70[b]
Distance Learning	Closed-circuit television courses (Transmission only)	100[c]
Conventional Telephony	Office telephones	525[d]

SOURCE: Congressional Budget Office based on the sources below.

a. Derived from CCA Consulting, *Network Hardware Market* (South Natick, Mass.: CCA, 1996); includes 15 percent to 20 percent additional for school wiring.

b. Derived from Quality Education Data, *1997-1998 Technology Purchasing Forecast* (Denver, Colo.: QED, 1997); excludes $20 million for content.

c. Derived from Hezel Associates, *Market Study: Video Communications Systems* (Syracuse, N.Y.: Hezel Associates, no date).

d. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, FCC 97-157 (adopted May 7, 1997), para. 531, note 1386.

CBO uses the FCC's estimate that $525 million per year of conventional telephony would be eligible for support.[13] That figure includes virtually all telephone services used by schools, regardless of their direct relationship to classroom instruction.

Accounting for Private Schools. The market analyses discussed above generally focus only on public schools. CBO expanded those estimates by assuming that private schools' spending for eligible telecommunications technologies was proportional to their share of total K-12 spending. Over the past 10 years, total private school spending has averaged 7.8 percent of total public school spending.

Accounting for Future Growth. CBO assumes that school spending will maintain its current pattern in the short term and that institutional inertia and conflicts over

13. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (May 7, 1997), para. 531, note 1386.

priorities will keep schools from shifting much more money to subsidized activities. In the longer term, schools will adjust their teaching and spending patterns, as much because of technological changes and an expected increase in the number of computer-literate teachers as because of the availability of federal subsidies.

K-12 school spending is rising, and eligible telecommunications expenses will probably rise with them. To estimate future spending on eligible categories, CBO uses a forecast from the Department of Education's National Center for Educational Statistics (NCES) of K-12 spending in constant dollars (the midlevel growth path) to account for growth in demand.[14] CBO then uses its own forecast of inflation to convert those figures into nominal dollars. In addition, to account for preexisting growth in school spending on computer systems, CBO adjusts the growth rate upward by 2 percentage points each year. Thus, in the 1998-2008 period, when overall school spending is forecast to increase by 63 percent in nominal terms, CBO estimates that school spending on computer systems technology will grow by 97 percent from its initial level in nominal terms. That underlying growth in the use of computer systems by schools drives much of the increase in CBO's estimate for education-related USF subsidies.

Sensitivity of Demand for Computer Systems. CBO assumes that there will be some response from schools to the subsidies. Presumably, school systems will increase their purchases of advanced telecommunications in rough accordance with the sensitivity of demand discussed below. One important caveat of this analysis is that shifts in school spending should be measured relative to the spending that would have occurred without the subsidy, not necessarily relative to spending in previous years.

CBO estimates that only 15 percent to 20 percent of the funds currently spent by schools on computer technology would be eligible for subsidy.[15] The subsidy thus would lower the total cost of a data communications system to a school by only about 10 percent (60 percent of 17 percent).

Because the subsidy applies only to the connections needed to make use of advanced telecommunications services and not to the whole computer system, USF subsidies could cover as little as 10 percent of the cost of the total system. Schools

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14. The NCES prepared high- and low-growth scenarios as well. See Department of Education, National Center for Educational Statistics, *Projections of Education Statistics to 2007* (1997), p. 82. The NCES forecast extends through 2007. CBO used that year's growth rate to project an additional year.

15. The ratio of eligible to total spending is similar to that found in the McKinsey & Company comprehensive blueprint for connecting U.S. schools to the Internet. See McKinsey & Company, *Connecting K-12 Schools to the Information Superhighway* (New York: McKinsey & Company, no date).

and local authorities will remain responsible for the bulk of such costs, most notably for the terminals or computers, software, support, and training. Schools might be expected to increase their demand for computer systems in response to the 10 percent subsidy, but not by a great amount.

Generally, CBO assumes that schools are limited in their ability to increase the share of their total computer system purchases devoted to computer networks and so increase the share of their total spending that would be eligible for subsidization. Many of the existing school computers are quite old, and schools would need to replace them with new models to have adequate access to the Internet.[16] Since computers cannot be purchased with USF subsidy money, that would limit the share of school spending going to eligible categories.

Economywide, the falling price of computer services has evoked a less than proportionate increase in such spending by consumers. In recent years, the real price of computer services delivered by personal computers (PCs) and their associated peripherals has dropped 25 percent to 30 percent annually, measured in dollars per unit of computing. Although the price of an individual PC may have remained constant, the memory is larger, the processor faster, and the peripherals more capable. Thus, the value the consumer receives has grown. Largely because of that increase in value, PC industry revenue grows by 15 percent to 20 percent annually. Thus, it is fair to say that, economywide, the demand for personal computers responds to price, but not exceedingly so.[17]

Sensitivity of Demand for Telephone Services. Although the USF subsidy will not reduce the total price of the computer systems needed to provide access to the Internet by very much, it could substantially reduce the price schools pay for telephone services, both wireline and wireless—by about 60 percent, on average. Schools will probably respond by increasing their use of telephones.

How much schools increase their use of telephone service depends on the sensitivity of their demand to price changes, often called the elasticity of demand. The range of estimates of that sensitivity is quite broad. One published analysis split the demand for telephone services into two types: business and residential. Presumably, educational institutions would more closely resemble the demand structure of businesses than homes. The analysis also separated demand for services

16. For example, according to QED, 17 percent of computers in schools are Apple IIs, which were designed in the late 1970s.

17. See, for instance, Erik Brynjolfsson, *Some Estimates of the Contribution of Information Technology to Consumer Welfare*, MIT Sloan School Working Paper No. 3647-94 (Cambridge: Massachusetts Institute of Technology, January 1994). CBO has found no studies differentiating the demand by schools from the demand by the rest of the economy.

by businesses between those that used the telephone companies' switches for internal communications (Centrex) and those with equipment on their own premises. The study concluded that the sensitivity of demand to price changes varied according to those factors and to the size of the firm. It found that the elasticity of demand for business use fell between -0.02 and -1.74, with the bulk of categories of firms being well under -0.5.[18] CBO used -0.5 to derive its estimated response.

When the elasticity of demand has an absolute value less than 1, the demand for the good is called inelastic. CBO assumes that with an inelastic demand and the USF subsidy, total spending by schools on telephone service would decrease. Schools, according to this analysis, would shift part of the savings from the subsidy to other activities. Only if the elasticity was greater than 1 in absolute value would total spending by schools for telephone service rise. However, total spending on telephone service, including both the school portion and the government subsidy, would rise in all but a few cases.

Initial Delays. Not all schools are likely to apply for the USF subsidy in 1998. Administrative delays will probably slow applications the first year. Many schools have not yet made a technology inventory assessment and plan, which is required by the FCC in order to qualify for the computer-related subsidies. Also, school districts may not have bid out the discounts in ways prescribed by the FCC and the Universal Service Fund administrator.[19] Thus, CBO assumes that initially only half of the eligible spending will actually qualify for subsidies, rising to three-quarters in the second year of the program and 100 percent thereafter. In addition, the program is scheduled to begin a full quarter into the federal government's fiscal year—only nine months of calendar year 1998 fall in fiscal year 1998—further reducing fiscal year 1998 spending (see Table 5 for yearly estimates).

Assumptions and Methods for Estimating Federal Payments Associated with Libraries

CBO estimates that subsidies for libraries will total $61 million for fiscal year 1998 and double to $127 million by 1999 (see Table 1). Based on FCC data and a series of reports on the cost of Internet services to public libraries commissioned by the National Commission on Libraries and Information Science, CBO assumes that each

18. Lester Taylor, *Telecommunications Demand in Theory and Practice* (London: Kluwer Academic Publishers, 1994), pp. 193-204.

19. In mid-July, the FCC recognized this problem and issued clarifying language that dispensed with some of the requirements needed to obtain discounts for calendar year 1998. See Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (Order on Reconsideration, July 10, 1997), para. 2.

TABLE 5. ESTIMATED K-12 SCHOOL AND GOVERNMENT SPENDING ON ADVANCED TELECOMMUNICATIONS IN SCHOOLS (By fiscal year, outlays in millions of dollars)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Base K-12 School Spending	6,487	6,950	7,479	8,012	8,541	9,097	9,701	10,341	11,029	11,746	12,504
Net Increase as a Result of Subsidy	41	93	139	154	171	188	208	228	251	275	302
Subsidy	478	1,019	1,453	1,548	1,641	1,738	1,843	1,953	2,072	2,195[a]	2,250[a]
Total	7,006	8,061	9,071	9,714	10,352	11,023	11,751	12,522	13,352	14,216	15,056

SOURCE: Congressional Budget Office.

a. Outlays for school and library subsidies are capped at $2.25 billion per year.

library would initially average $11,300 in eligible expenses per year: $6,700 for computer networks and $4,600 for conventional telecommunications.[20] The subsidy would be equal to roughly 60 percent of eligible spending, assuming that the library subsidy structure is similar to the school structure and that spending by libraries exhibits the same sensitivity to price changes as school spending. Administrative delay and other factors might keep spending in 1998 lower than the amount allowed by formula, but not as much as in the case of schools.

Assumptions and Methods for Estimating Federal Payments Associated with Nonprofit Rural Health Care Providers

CBO's estimate of the total subsidies to nonprofit rural health care providers rises from $25 million in 1998 and peaks in 2006 at $174 million (see Table 1).

The USF would subsidize two types of advanced communications for health care providers: dedicated telemedicine lines and Internet access. Health care providers use dedicated lines to access other health care providers for consultation, telemedicine, and the sharing of diagnostic results. The subsidy will also cover administrative and other communications, insofar as they have a distance component. Because the National Library of Medicine and other health-related databases are increasingly available through the Internet, CBO assumes that health care providers will expand their use of the Internet.

Rural health care providers will install digital telephone lines gradually, and not all providers are likely to demand the highest level of service, especially given the high costs of the unsubsidized portion of medical telecommunications systems. The FCC estimates that there are 12,200 nonprofit rural health care providers.[21] CBO assumes that half of the rural health providers would want T-1 lines and half a lower level of digital service, called integrated services digital network (ISDN) service, which can operate at 128,000 bits per second under optimal conditions. The rural/urban price differentials for T-1 service are higher than similar differentials for ISDN. Based on information from the Rural Utilities Service, CBO estimates that the annual difference between rural and urban rates for a T-1 line would be $25,000

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20. John Bertot, Charles McClure, and Douglas Zweizeig, *The 1996 National Survey of Public Libraries and the Internet: Progress and Issues* (Washington, D.C.: National Commission on Libraries and Information Science, 1996). The United States has 8,900 library systems that occupy 15,000 buildings with books in them (many metropolitan library systems have multiple buildings).

21. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (May 7, 1997), para. 706. Counting offices that are used intermittently for groups and other mental health practice might raise this number, but CBO assumed that such groups do not have substantial telemedicine requirements.

per line.[22] CBO also assumes that T-1 and ISDN prices are declining at 3 percent per year to incorporate new technology. Further, CBO assumes that those lines would be phased in, with 70 percent of rural health care providers connected to either ISDN or T-1 by 2008.

CBO adds $180 per month per provider for toll-free access to the Internet.[23] It assumes that the adoption rate for the Internet by health care providers would be much more rapid than for digital lines and would reach 90 percent of qualified health care providers by 2008.

Basis for Estimates of Federal Revenues for the Universal Service Fund

The general policy for universal service is to cross-subsidize within the telecommunications sector and not draw on general revenues to meet the costs associated with that policy. Thus, over the long run, CBO assumes that the fund will be deficit neutral. As is the case with current universal service subsidies, the inflow of funds to pay for the new subsidies will come from telecommunications carriers. Those carriers will then shift the costs of the subsidies by increasing the rates charged to telephone users.

The May 1997 FCC order directs the fund administrator to collect $300 million for the school and library fund and $100 million for the rural health care provider fund for fiscal year 1998 from telecommunications carriers. However, in December, the FCC reconsidered and reduced that amount. The fund administrator is to collect $300 million in the first quarter of calendar year 1998 for the school and library fund. For the second quarter, the administrator is to collect as much as required by the demand for subsidies, but no more than $325 million.[24] For the medical fund, the FCC directs the administrator to collect $25 million in the first quarter and, for the second quarter, as much as required by the demand for subsidies, but no more than $25 million. CBO assumes that the fund administrator will refund any surpluses and will reduce collections for subsequent quarters to keep the fund deficit neutral during and after 1998.

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22. Prepared statement of Adam Golodner, Deputy Administrator, Rural Utilities Service, before the Federal-State Joint Board, June 19, 1996 (available at http://www.usda.gov/run/home/june19j-b.txt). CBO assumes that ISDN rates are 40 percent of T-1 rates and that installation cost differentials are $1,000 per site.

23. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (May 7, 1997), para. 708.

24. Federal Communications Commission, *In the Matter of Federal-State Joint Board on Universal Service* (Third Order on Reconsideration, December 16, 1997).

The order names the National Exchange Carrier Association (NECA) as temporary administrator of the fund. NECA administers the current Universal Service Fund, which has responsibility for telephone relay services for the hearing-impaired, as well as for the Lifeline and Linkup Programs that subsidize low-income subscribers.

NECA has formed three independent subsidiaries to handle the expanded Universal Service Fund programs. One subsidiary, the Schools and Libraries Corporation, will process applications for subsidies from schools and libraries. Another, the Rural Health Care Corporation, will handle applications from health care providers. The third subsidiary, the Universal Service Administrative Company, will provide reimbursements to the telecommunications services providers.

The Universal Service Administrative Company will collect from the 3,500 or so telecommunications carriers who are expected to contribute monthly to the USF. NECA currently deals with that many carriers for its telephone relay services program fund, which is quite small. Its larger funds, Lifeline and Linkup, have only 65 or so participating carriers.