CIRF

Converging Industries Research Foundation

Practical Solutions for Communications Policy

Overview of Universal Service

December 6, 1995
Presentation at the Communications Media Center,
New York Law School,
New York, NY

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Overview of Universal Service

Carol Weinhaus, Bob Lock, Harry Albright, *et al*.
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Presentation at the Communications Media Center, New York Law School
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The Telecommunications Industries Analysis Project is associated with the Public Utility Research Center at the University of Florida College of Business Administration.

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1995 Participants in the Telecommunications Industries Analysis Project

State Regulators	NARUC representatives from: Illinois Commerce Commission Iowa Utilities Board Massachusetts Department of Public Utilities New York Public Service Commission Ohio Public Utilities Commission Washington Utilities and Transportation Commission
Regional Holding Companies	Ameritech Bell Atlantic BellSouth NYNEX Pacific Telesis SBC Communications Inc. US WEST
Independents	Anchorage Telephone Utility GTE Sprint Local Telecom Division
Interexchange Carrier	AT&T Sprint
Cellular and Wireless Carriers	Sprint Cellular
Foreign Domestic	InfoCom Research, Inc. NTT America
Local, National, and International Services	BT France Telecom North America
Materials Manufacturers	Corning
Telecommunications Equipment Manufacturers	Nortel

Sponsors:

Corporation for Public Broadcasting

Assisting with *public* data:

Bellcore
Federal Communications Commission
National Exchange Carrier Association

Project Background, cont.

Background on the Telecommunications Industries Analysis Project

The goal of the Telecommunications Industries Analysis Project is to provide information to support the development of alternative communications policies to meet the needs of stakeholders in an environment that includes competitive and non-competitive markets, federal and state regulatory jurisdictions, and a proliferation of new services made possible by technological advances. The purpose of the project is to produce research and analysis which will assist policy makers in making informed decisions.

The project is a neutral forum of communications industry stakeholders exploring multiple viewpoints of selected issues. This forum incorporates the following elements:

- **Broad representation:** The current forum includes foreign and domestic local exchange carriers (LECs), interexchange carriers (IXCs), materials and equipment manufacturers, and federal and state regulators. The project actively seeks expansion of this forum to include other communications industry representatives such as competitive access providers, cable television companies, computer companies, electric power utilities, or publishers.

- **Multiple viewpoints:** Participants are required to play an active role in the research and analysis, to represent their own interests, to understand and to assist in developing others' perspectives, and to work toward the common goal of representing multiple views.

- **Analysis and results of alternative policies:** Research tools, including a jointly produced data base and computer software models, and data analysis developed by this forum create a common language for examining issues. The common language allows the participants to focus on underlying issues. Appropriate computer software tools, including modifications to existing tools, are developed.

- **All data, analysis methods, and results are public:** Data used by this project must be publicly available on a nationwide basis. Research products become public domain information.

- **Neutral setting:** The project resides in a neutral setting, free of partiality, thereby ensuring objective and independent research.

What the Project has Done

The project has conducted public workshops at the national meetings of the telecommunications industry regulators. The project's research papers have been the basis for meetings with the Federal Communications Commission, Congressional staffs, the Congressional Research Service, and the National Telecommunications Information Administration.

The project has also produced a number of papers plus software modeling tools for analysis of financial structures and new technology deployment.

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I. Introduction

Introduction

Currently there are debates over the provision of telecommunications services in the United States. These debates involve a number of issues; however, one of the most important is the debate over Universal Service. While technically undefined, Universal Service is generally interpreted to mean the widespread availability of telecommunications service to all Americans at affordable rates.

These debates center around a number of questions:

- What should the definition of Universal Service be?
- Are subsidies needed to keep Universal Service "affordable"?
- What is the appropriate level of subsidy?
- Who should pay for the subsidies?
- How do you insure that "basic local service" remains affordable in an environment of increasing competition?

The objective of this paper is to provide an overview of the work that the Telecommunications Industries Analysis Project (TIAP) has done during the past four years on the subject of Universal Service. This paper uses key figures and text from other TIAP papers in a summary format to explain the issues, quantify the current subsidies, and lay out various policy options.

The rest of this paper covers the following items:

- **Section II, Current Subsidies:** Gives estimates for the amount of various current subsidies and explains why current subsidies are needed. Also shows how some customers subsidize other customers.

- **Section III, A Need for New Subsidy Structures:** Explains how the current subsidy structure is incompatible with the increasingly competitive communications marketplace. Also shows the potential impact of eliminating one form of subsidy, rate averaging, on rural customers.

- **Section IV, A New Basis for Subsidies:** Shows how existing subsidy structures can be changed to work in both competitive and non-competitive markets. Also explains the need for transitions from the current system to a new system and explains how that can be done.

- **Section V, Implications of Changing What Universal Service Means:** Gives the impacts of changing the definition of Universal Service to include advanced telecommunications services and of mandating service before it becomes widely available.

II. Current Subsidies

Current Subsidies

The concept of "Universal Service" has long been a part of the telecommunications industry in the United States. However its meaning has changed over time. Originally, the concept of Universal Service meant a widespread, interconnected telephone network wherein every user of the network could connect with every other user. [1] Theodore Vail, President of AT&T, first coined the term "Universal Service" in 1907. The 1910 *Annual Report* of AT&T contains the following statement: " [The Bell System] believes that the telephone system should be universal, interdependent and intercommunicating, affording opportunity for any subscriber to any exchange to communicate with any other subscriber of any other exchange within the limits of speaking distance." [2] While this definition may seem identical to today's definition, it did not embody the system of subsidies designed to assure "affordable" service to everyone. The idea was simply that, the network became more valuable as a whole as more people were added to it. [3]

It has only been in the recent past that the concept of Universal Service has evolved to mean the provision of service to everyone at "affordable rates." With that redefinition has come a complex system of subsidies wherein some companies and customers pay a portion of the costs of providing service to other customers. Within the traditional telephone industry, these subsidies are inextricably intertwined with one another, and with the cost accounting structure regulating the entire industry. These subsidies (both explicit and implicit) are generally designed to achieve the public policy goals of assisting low-income households and keeping basic local service rates affordable.

Figure 1 lists many of the subsidies embedded in the current system. While this system worked fairly well in a monopoly environment, growing competition is rendering this system obsolete.

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[1] Milton Mueller, Universal service in telephone history: A reconstruction, " *Telecommunications Policy,* Butterworth-Heinemann Ltd., July, 1993.

[2] AT&T, *Annual Report,* 1910, page 43.

[3] For a more complete discussion of the development of Universal Service, see Milton Mueller, "Universal service in telephone history."

II. Current Subsidies, cont.

Figure 1: **What are the Subsidies? Current Public Policy Goals: Some Support Mechanisms and Forms of Averaging Associated with the Regulated Telecommunications Industry**

Rate and Cost Averaging to Achieve Public Policy Goals:

Provide "reasonable" rates on a non-discriminatory basis.
Allocation of historic costs to determine costs for pricing.
Differences between business and residential rates.
Use of fully distributed cost methodology to allocate common overheads.
Pricing averaged across broad geographic areas to promote universal service and Infrastructure development.
Etc.

Financial Assistance to Ensure Universal Service:

Targeted high-cost and low-density areas:

- Universal Service Fund.
- Long-term support.
- Small telephone company local switch support
- REA loans

Low income households:

- Lifeline programs.

Offshore areas:

- Assistance to Alaska, Virgin Islands, Puerto Rico, and Hawaii for interconnection to traditional industry network in the contiguous 48 states.

Obligation to Serve:

Carrier of Last Resort.

- High-Cost and Low-Cost Locations.
- Facilities ready to serve a customer (large or small) whenever they want.

Interconnection (Mobile Carriers, Competitive Access Providers, Enhanced Service Providers, etc.)

Intrastate Service Paying 75% of Shared Local Facility Costs:

Local Exchange Rates.
Interexchange Usage Charge
Other.

Special Needs Assistance for Equivalent Access to Telecommunications Network:
Telecommunications services for hearing-impaired and speech-impaired individuals.

Oversight of Jurisdictional Shifts:

Participation through Federal-State Joint Board.
Maintain "reasonable" basic local service rates.

Depreciation Policies:

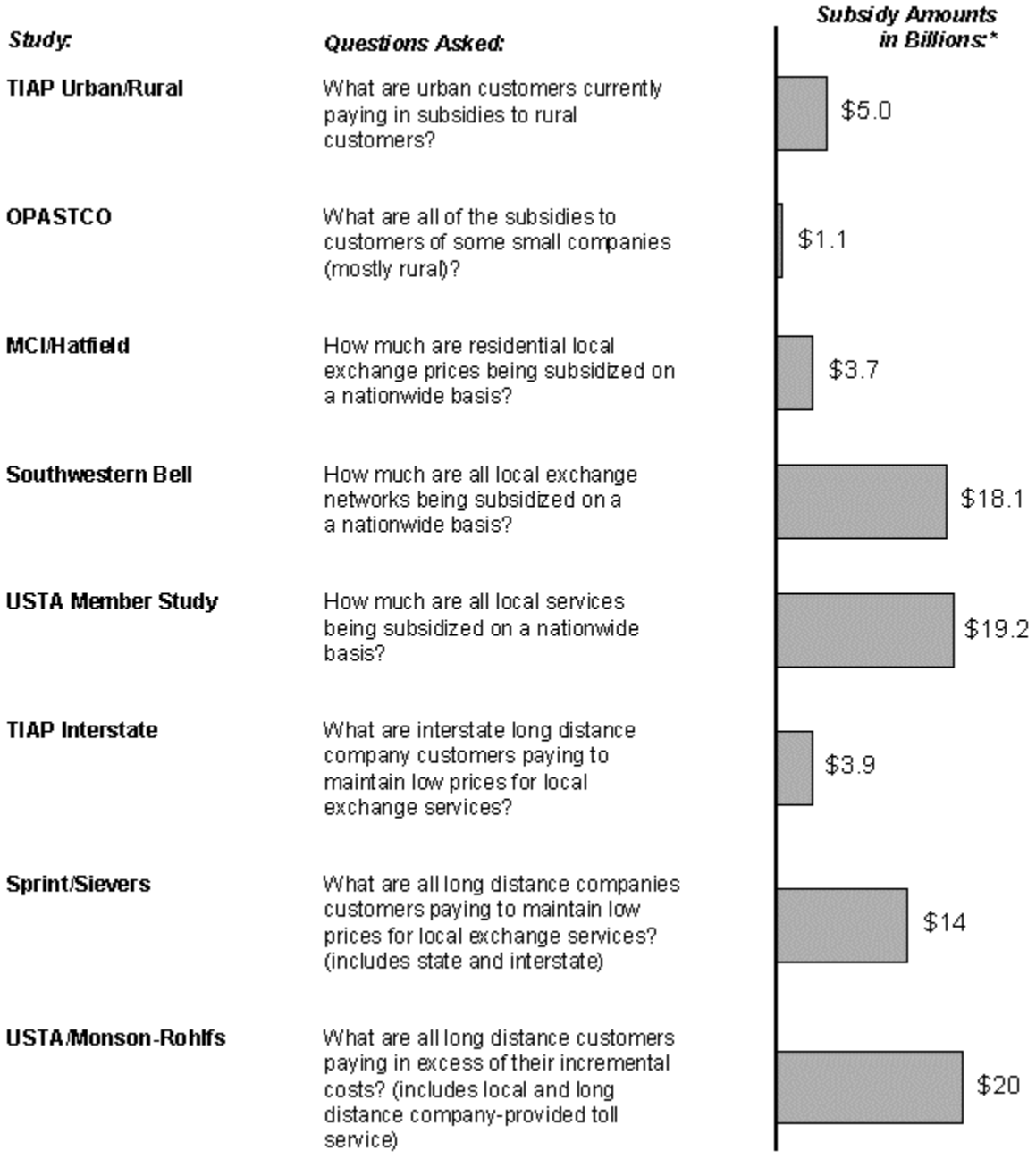
Multiple Mechanisms and Authorities.

Source: Carol Weinhaus, Sandra Makeeff, Mark Jamison, *et al., Who Pays Whom? Cash Flow for Some Support Mechanisms and Potential Modeling of Alternative Telecommunications Policies*, Alternative Costing Methods Project, Boston, MA, 1992, Figure 1, page 4.

What are the Amounts of the Subsidies?

There are numerous studies which attempt to quantify the various subsidy amounts. **Figure 2** shows the questions asked by each study and the amount of the subsidy estimated. The amounts from each study are different because each study asks different questions. There is a temptation to add or subtract these different study results; however, without detailed knowledge of each study, the resulting calculations are meaningless.

Figure 2: What Question Does Each Subsidy Address? Examples of Subsidy Studies and Their Results

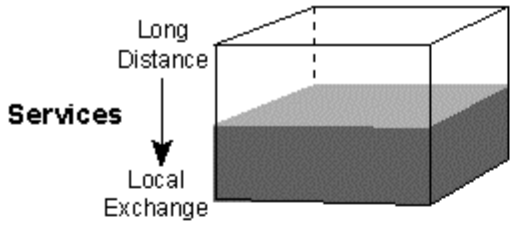


Source: Carol Weinhaus, Teresa Pitts, Mark Jamison, *et al., Apples and Oranges: Differences between Various Subsidy Studies,* Telecommunications Industries Analysis Project, Boston, MA, 1994, Figure 1, page 2.

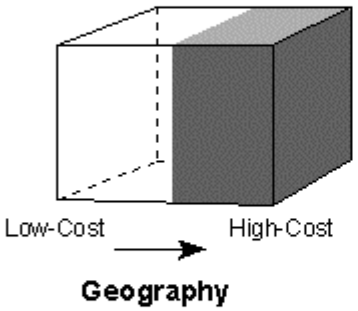
Why are the Subsidy Amounts Different?

In addition to answering different questions, each study uses different approaches, definitions, data sets, and subsidy flows. For example, **Figure 3** shows that, at any particular time, subsidies flow along three directions: between services, between geographic areas, and between customers. In addition, there are various views as to what constitutes incremental cost. For example, the MCI/Hatfield and the USTA/Monson-Rohlfs studies each use different definitions.

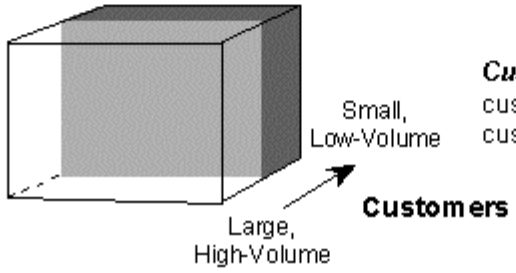
Figure 3: Why are the Subsidy Amounts Different? Subsidy Flows by Three Market Segments



Services: From long distance services to local exchange services.



Geography: From low-cost markets (generally urban) to high-cost markets (generally rural).



Customers: From large, high-volume customer markets to small, low-volume customer markets.

Source: *Apples and Oranges,* Figure 3, page 4.

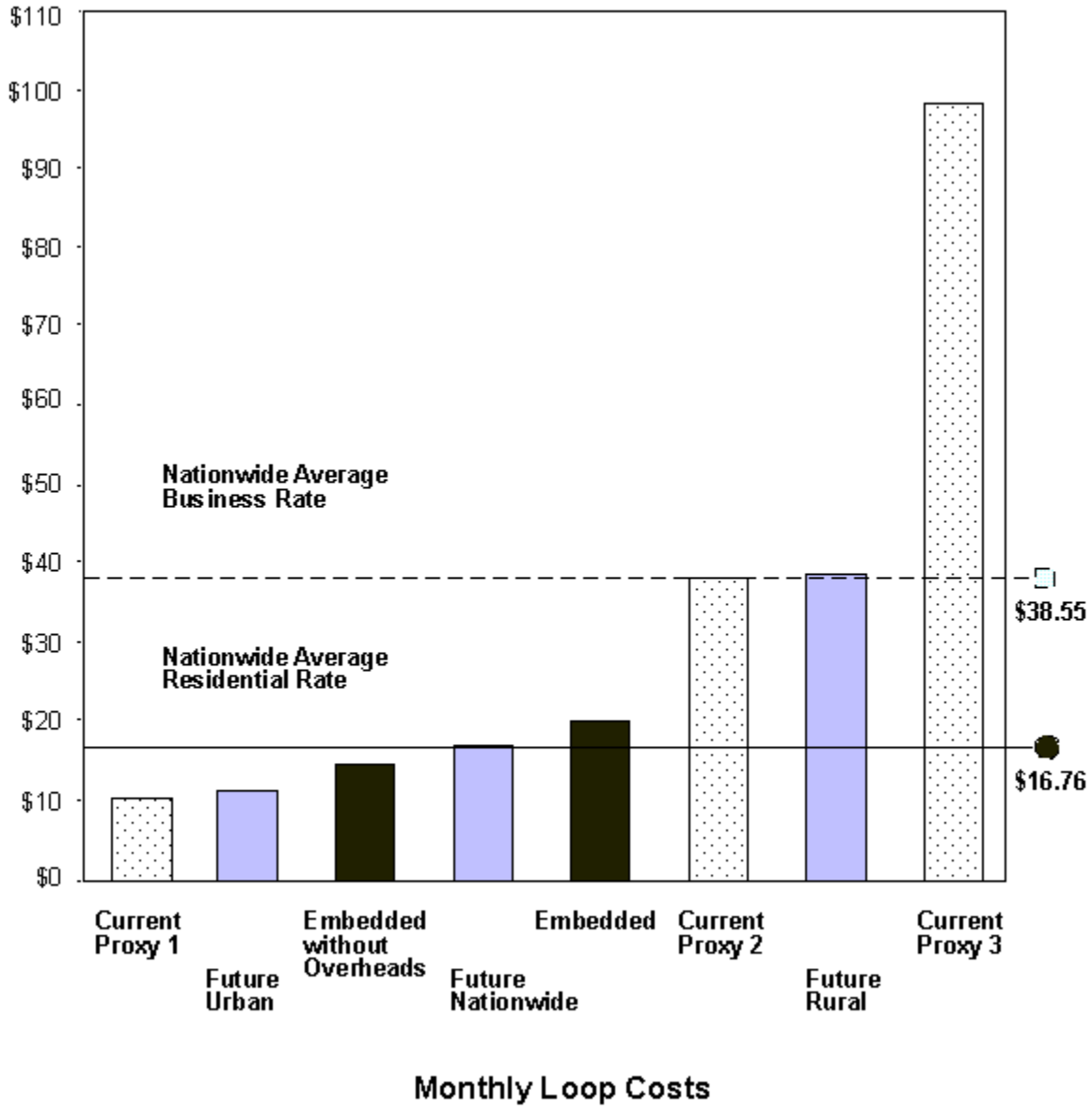
Why are Subsidies Needed?

Figure 4 illustrates one example of why subsidies are needed. In this case the subsidy is used to help cover the cost of the local loop (see **Figure 1**.) **Figure 4** shows that regardless of the method for defining loop costs (embedded, embedded without overheads, proxy, or future costs), in some cases the price for local service does not cover its cost. Furthermore, since the prices have to cover more than just the cost of the loop, this figure understates the issue. For example, the costs for switching and operator services are not included in this figure. The difference between costs and rates may be much greater due to customer location, and the density of customers in an area.

The residential and business rates indicate nationwide averages. [4] Since the business rates in most cases are sufficient to cover the average embedded cost of the loop, most of the local subsidies are for residential customers.

[4] In the traditional telephone industry, business rates are generally higher than residential rates.

Figure 4: **Why are Some Subsidies Needed?**
Comparison of 1993 National Average Residential and Business Rates with Loop Costs



Sources: Embedded costs are from the *FCC Monitoring Report*, Table 3.3; current proxy costs developed by applying long-run incremental unit investments (Bridger M. Mitchell, *Incremental Costs of Telephone Access and Local Use*, prepared for the Incremental Cost Task Force, The RAND Corporation, Santa Monica, CA, R-3909-ICTF, July 1990, Figures C.1, C.2a, C.2b, pages 86-88) to three examples of different population density and distance from the telephone company's central office; future costs (Future Urban, Future Rural, Future Nationwide) are from the TIAP *New Technology Deployment Model* adjusted to allow comparisons with other methods for determining loop costs. For more details, see Carol Weinhaus, Sandra Makeeff, Peter Copeland, et al., *Loop Dreams: The Price of Connection for Local Service Competition*, Telecommunications Industries Analysis Project, Boston, MA, 1995.

II. Current Subsidies, cont.

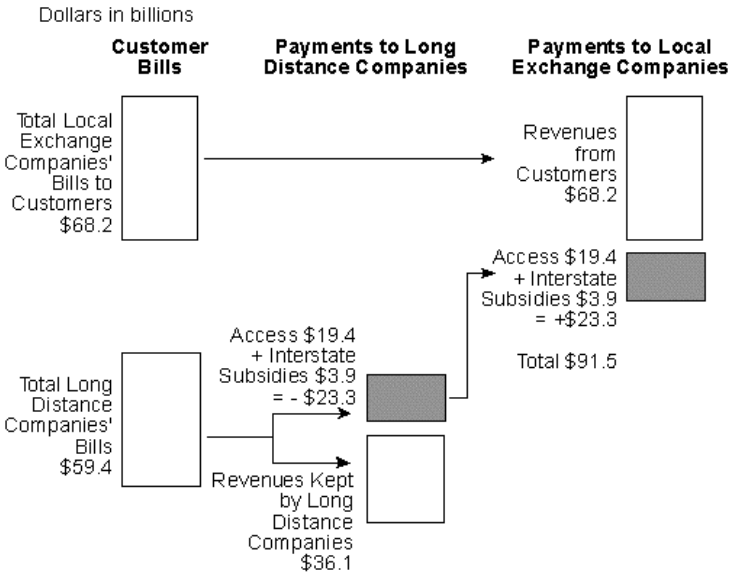
How have Interstate Long Distance Customers Subsidized Local Customers?

Figure 5 shows the 1992 cash flow for payments made by long distance customers to support local customers, including interstate subsidies. The shaded box indicates the amount of long distance company revenues that are paid to local telephone companies for interconnection and for support. Approximately 45% of the long distance companies' costs are payments to local exchange companies. These support payments reflect public policies that include assistance to high-cost areas, low-income households, and to keep basic local service prices low.

This is a traditional view of the communications markets. This view assumes that traditional local and long distance companies are the only players. Limiting the discussion of subsidies to these two types of companies reflects the old boundaries that defined the traditional telephone industry. Interstate and other subsidy mechanisms created a payment system to promote things people wanted.

The current subsidy mechanisms are inconsistent with the new competitive environment. Customers and companies who pay subsidies look for ways to avoid them. Existing subsidy payments benefit some companies more than others. The companies who benefit the most therefore have a financial stake in preserving the current system.

Figure 5: **What is the Amount of Subsidy Flow between Traditional Interstate Long Distance and Local Markets? 1992 Cash Flow for Some Support Mechanisms: Explicit Subsidies**



Note: **Subsidies shown are explicit interstate subsidies only. Access is state and interstate.**

Source: **Adapted from models used in Carol Weinhaus, Sandra Makeeff, et al., Who Pays Whom? Cash Flow For Some Support Mechanisms and Potential Modeling of Alternative Telecommunications Policies, November 15, 1992, Figure 7, page 14. Data from Federal Communications Commission, 1991/1992, and United States Telephone Association, 1992.**

III. A Need for New Subsidy Structures, cont.

Why is a Change in the Subsidy Structure Needed?

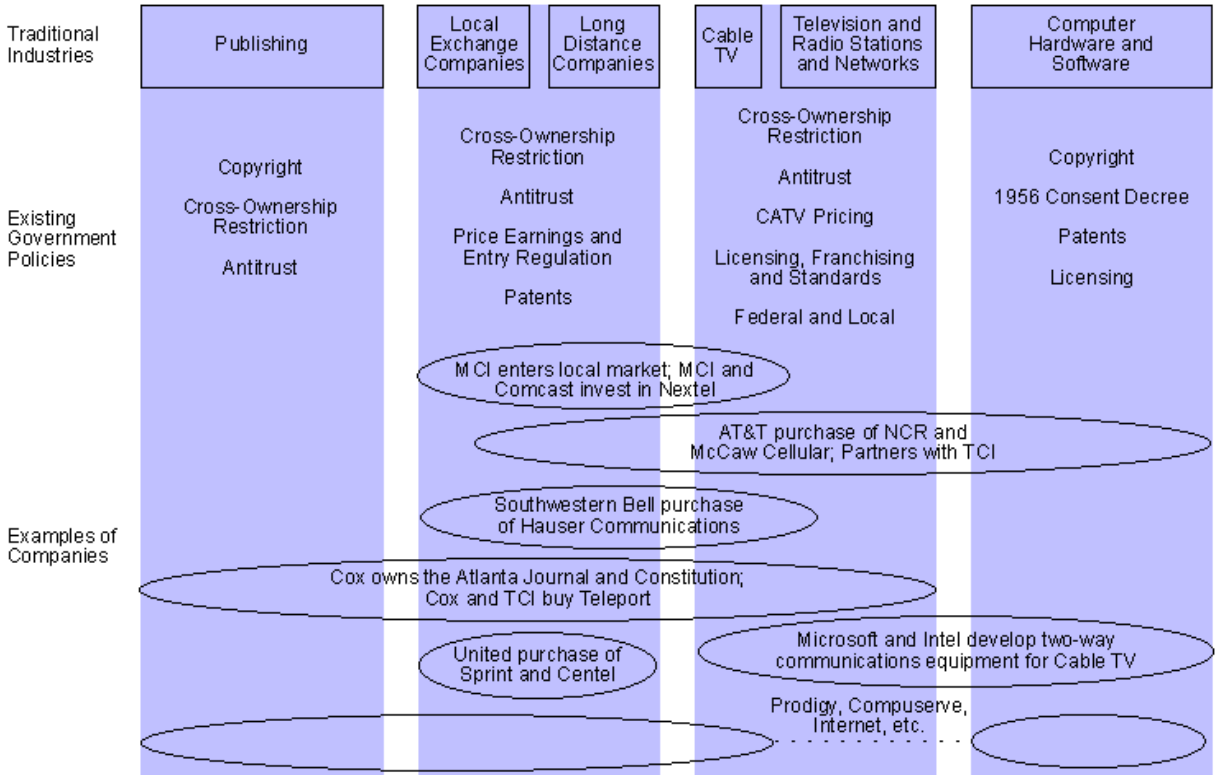
Figure 6 shows that while existing government policies still treat various communications industries along traditional industry boundaries, new technologies and competition are making these boundaries obsolete. Different public policies were developed for each traditional communications industry - publishing, telecommunications, broadcast/cable TV, and computer. These industries are no longer separate.

Traditional communications companies developed within the traditional industry boundaries determined by technology and, in some instances, reinforced by public policy. Today, companies are crossing traditional industry boundaries to form new hybrids. These companies use technologies that allow products and services to become increasingly interchangeable.

Public policy, however, continues to treat each industry's products and services differently, depending on the traditional regulation of the industry. In some instances, public policies create artificial barriers between industries.

In the past, public policies for telecommunications created subsidy flows between various markets and used nationwide averaging as a mechanism to support these flows. The introduction of new technologies and competition has eroded the foundations for these subsidies.

Figure 6: **Why is a Change in the Subsidy Structure Needed?**
Existing Government Policies, Traditional Industries, New Alliances, 1993



Source: *Abort, Retry, Fail?,* Figure 3, page 6.

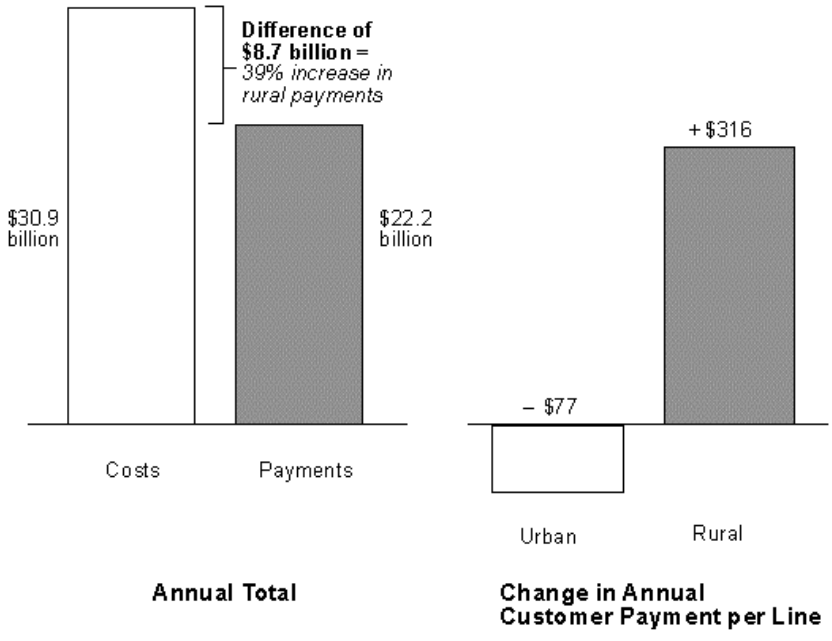
What is the Impact of Deaveraging on Rural Customers?

Traditional telephone practices keep prices low for rural customers because urban customers pay for a portion of the cost of rural telephone service. These practices are called price "averaging" - prices are averaged across areas with higher costs and areas with lower costs. Averaging was possible because there was no competition.

Competition is driving deaveraging of urban and rural prices. Competitors tend to pick low-cost areas and high-volume customers because they can offer service to these areas and customers at a lower price. These tend to be urban areas or the center of town in a rural area. Customers in these areas are beginning to have competitive alternatives that allow them to avoid the higher prices caused by the averaging process. The remaining customers with higher costs pay higher prices.

Figure 7 shows a potential impact of deaveraging nationwide urban and rural rates. In this example, prices paid by rural customers increase to cover the costs of rural telephone service. If this occurs, and if costs are unaffected by competition, then prices in rural areas would increase $8.7 billion, or 39% (1991 dollars). This translates into a decrease in urban customers' annual payments of $77 and an increase in rural customers' annual payments of $316.

Figure 7: What is the Impact of Deaveraging Nationwide Urban/Rural Rates?
1991 Potential Impact of Deaveraging Urban and Rural Rates



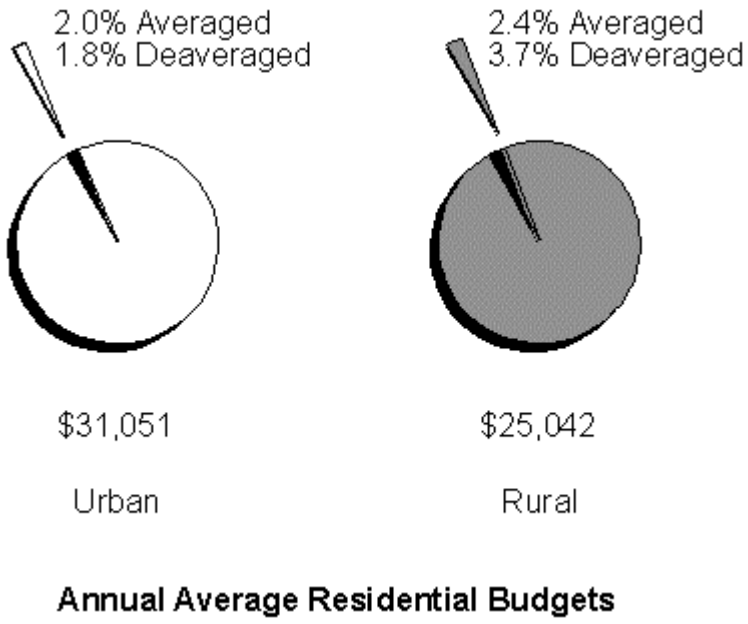
Source: Carol Weinhaus, Sandra Makeeff, Peter Copeland, *et al., What is the Price of Universal Service? Impact of Deaveraging Nationwide Urban/Rural Rates,* Telecommunications Industries Analysis Project, Boston, MA, 1993 adapted from Figures 3 and 4, pages 11 and 13.

What is the Impact of Rate Deaveraging on Residential Customer Budgets?

The pie charts in Figure 8 indicate nationwide average budgets for urban and rural households. The 1991 urban average budget was $31,051 and the rural average budget was $25,042. In 1991, rural customers paid approximately 2.4% of their household budgets on telephone service; urban customers paid approximately 2.0%.

The slice from each pie chart indicates the impact of deaveraging telephone rates: urban rates decrease to 1.8% of the budget and rural rates increase to 3.7% of the budget. This is less than what households spend on dining out. [5]

Figure 8: **What is the Impact of Urban/Rural Telephone Rate Deaveraging on Residential Customer Budgets?**



Source: *What is the Price of Universal Service?*, Figure 5, page 14.

[5] Households spend on average of $461/year on eating out for lunch. Source: *How We Spend Our Money*, Consumer Research Center, The Conference Board. Based on a survey by the U.S. Department of Labor, Bureau of Labor Statistics, 1995.

What is the Impact of Rate Deaveraging on Rural Telephone Subscribership?

While **Figure 9** indicates that on average the changes are not major when taken on an individual basis, there are some customers who will be adversely affected by rate deaveraging. (See **Section VII** for background information and assumptions used for **Figure 9**).

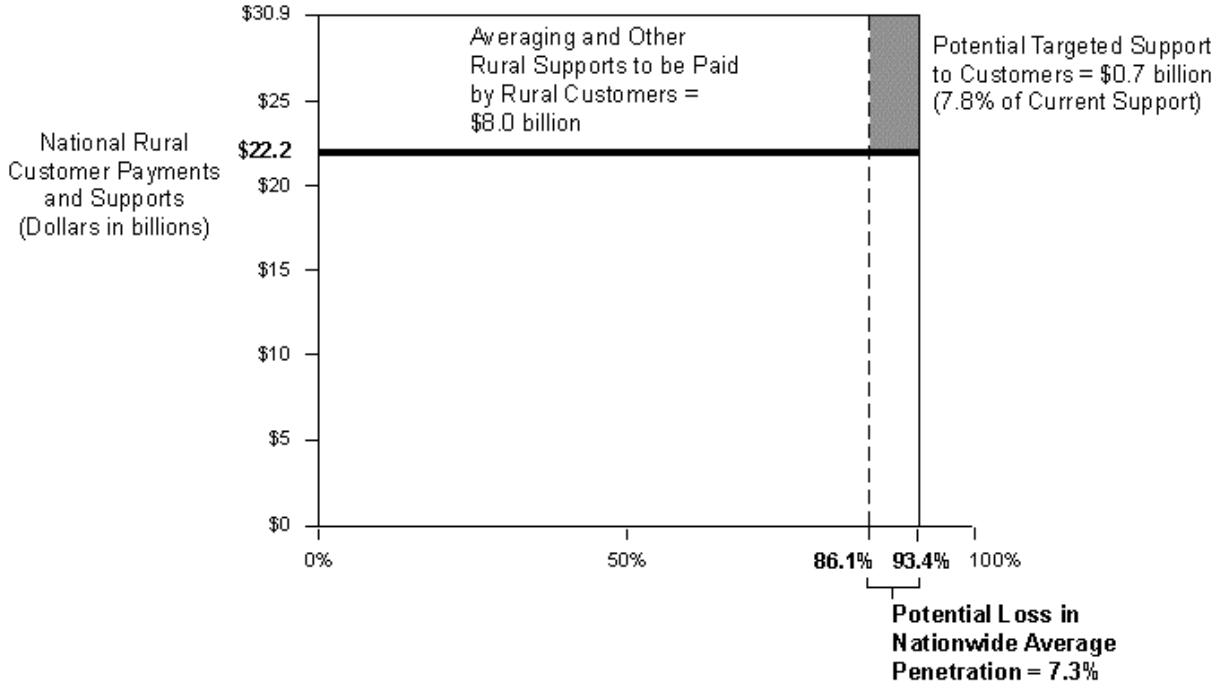
Currently, some customers are able to purchase telephone service only because their rates are supported through averaging and other support mechanisms. Other customers might be able to pay the increased price but may choose not to because, in their judgment, the service isn't worth the increased cost. **Figure 9** indicates that current customer bills ($22.2 billion) for rural areas are supplemented with additional revenues ($8.7 billion). Therefore, the total cost of providing nationwide rural telephone service is $30.9 billion.

If the extreme case for urban/rural deaveraging were to occur and if support mechanisms were to disappear, prices for rural services would increase. Given these two assumptions, approximately 7.3% of the rural households could either no longer afford residential service or may not choose to pay the higher price even though they could afford it.

The vertical dashed line in **Figure 9** indicates the lowered penetration level. Those customers to the left of this dashed line would still buy telephone service. The prices these customers pay increase to cover the previous support ($8.0 billion). However, those households to the right of the dashed line may need additional support from external sources ($0.7 billion) if these households are to keep residential service.

This alternative answers two questions: the level of rural support and who receives it. This example assumes that 92.7% of the 1991 rural customers would pay an additional $8.0 billion in increased rates for all their telephone services. In this alternative, support of $0.7 billion is paid to those rural customers who may no longer be able to afford service or may choose not to buy it. This is in contrast to current policies which flow most supports to the high-cost companies and their customers, regardless of the customers' ability to pay for the service.

Figure 9: What is the Impact of Urban/Rural Rate Deaveraging on Rural Telephone Service Penetration?



Source: *What is the Price of Universal Service?,* Figure 7, page 19.

IV. A Need Basis for Subsidies

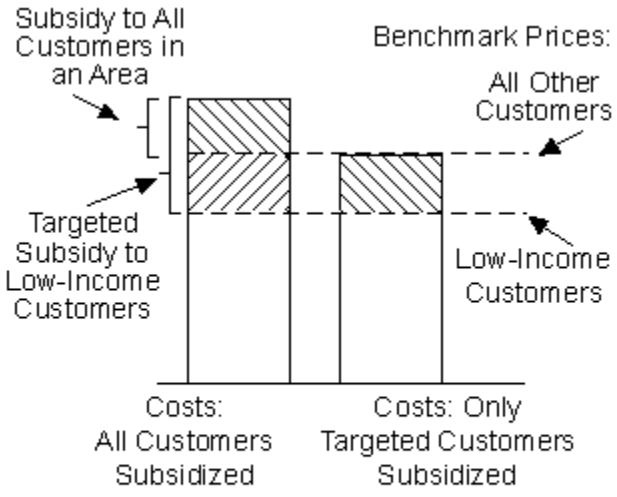
How Can Subsidies Accommodate Both Competitive and Non-Competitive Markets?

Figure 10 illustrates one approach to determining the amount of subsidy needed. This approach is called the Benchmark Subsidy Method. In this approach, a single mechanism applies for subsidies regardless of whether a market is competitive. The Benchmark Subsidy Method provides incentives to service providers to be efficient and allows competitive markets to operate efficiently.

Under the Benchmark Subsidy Method, a benchmark price for telephone service in an area would be determined. The regulatory process would then determine the new subsidy amount for an area by subtracting the benchmark prices from the costs. Subsidies would not be necessary when benchmark prices were equal to or above costs. Costs may be determined by any of a number of methods.

Subsidies could be general or specific, or both. An example of a general subsidy is one applied to all customers in an area. An example of a specific subsidy is one applied to low-income customers. The chart illustrates both of these examples. In the same area, it is possible to have both of these subsidies. The dashed horizontal lines indicate two different benchmark prices.

Figure 10: What is One Alternative for Determining the Amount of Subsidy? The Benchmark Subsidy Method



Targeted Benchmark Prices

Source: Carol Weinhaus, Terry Monroe, Mark Jamison, *et al.*, *Universal Service Toolkit, Part 2: Beyond Cost Allocations: Benchmark Subsidy Method*, Telecommunications Industries Analysis Project, Boston, MA, 1994, page 9.

How Do You Transition From the Current Environment to the Future?

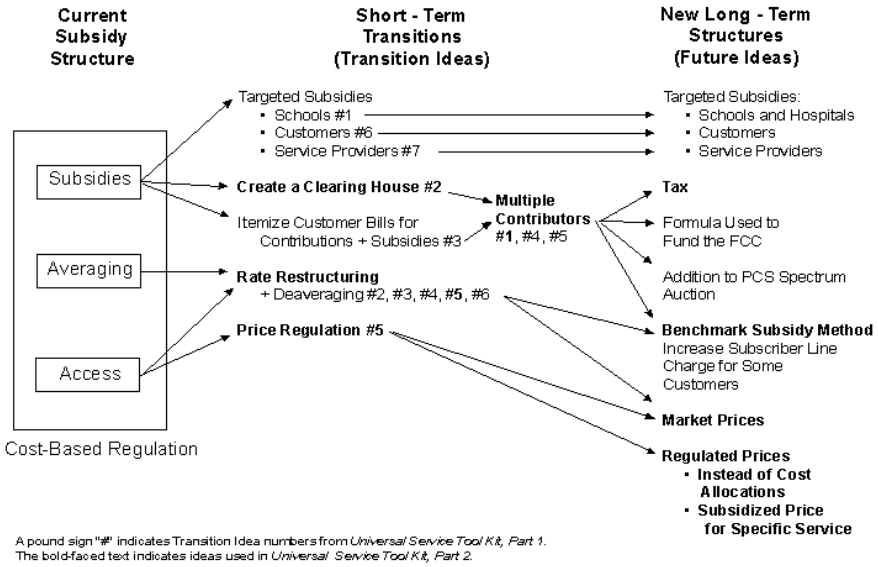
While it is necessary to look at long-term revisions to the current structure, a transition process is necessary to get us from here to there. Transitions are needed for at least two reasons:

- **It is politically unacceptable to have major shocks to companies and customers.** On the first day of the transition to a new structure (phase in), the world should look exactly the same as on the last day of the old structure (phase out).

- **It is difficult to make a major change when the outcome is unknown.** Often people will choose not to act if the result is uncertain, especially if they believe they may be adversely affected.

The enormous amounts of money involved, major political fallout, and other consequences serve as barriers to immediate sweeping changes to the current system. However, if the markets continue to move rapidly due to the forces of technology and competition, major dislocations may occur if no short-term actions are taken. **Figure 11** depicts a number of short-term solutions, which, when linked with one another, may help lead to major revisions of the current system. Each solution shows a transition from the current mechanism to a new one. For each short-term solution, the first day of the transition must look the same as the last day of the current system.

Figure 11: How Do You Transition From the Current Environment to the Future? Flow From Current Subsidy Structure With Transitions Leading to New Long-Term Structures



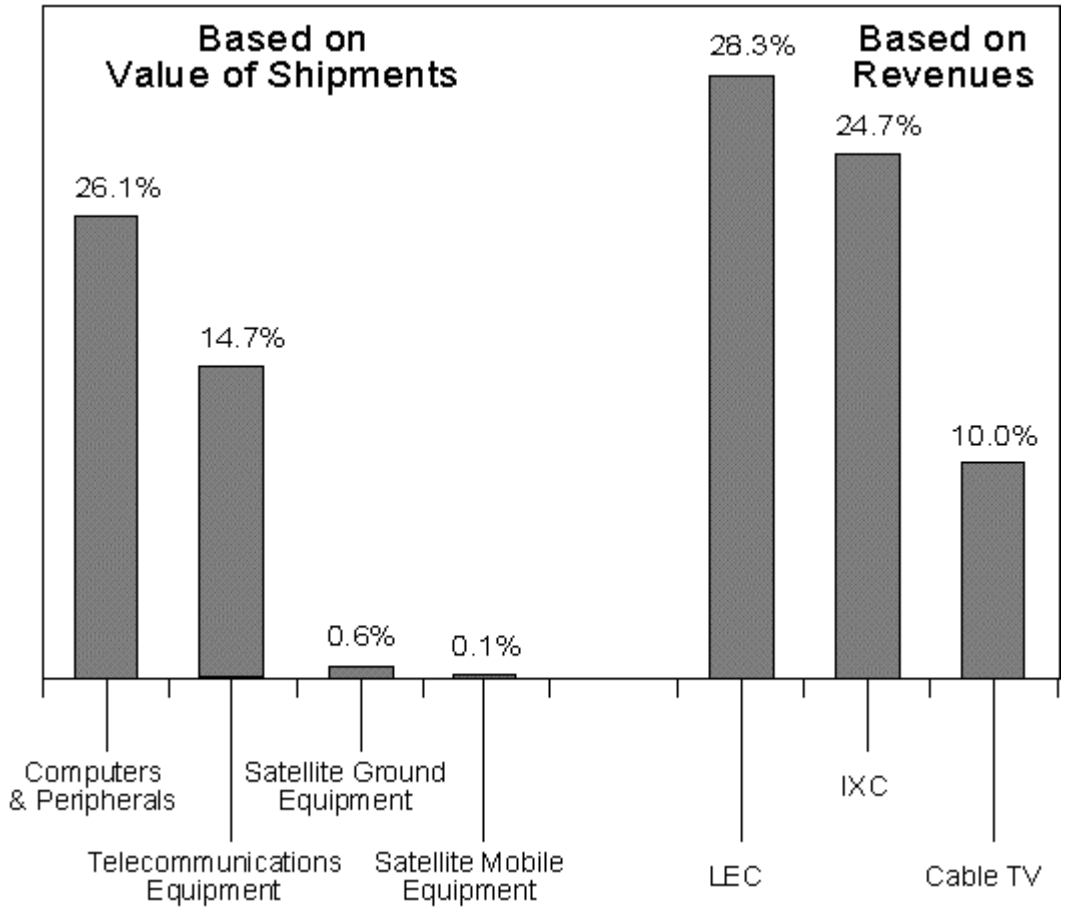
Source: Carol Weinhaus, Terry Monroe, Mark Jamison, et al., Universal Service Toolkit, Part 2: Beyond Cost Allocations: Benchmark Subsidy Method, Telecommunications Industries Analysis Project, Boston, MA, 1994, Figure 1, page 3.

Who Pays the Subsidy?

During the transition, current subsidies are phased out and eventually replaced by support payments from the new funding source. Prices that traditionally fund subsidies decrease at the same rate that new subsidy funding becomes available.

One method of revising who pays the subsidies eliminates the current patchwork in which some companies' customers pay and other companies' don't. The new mechanism uses some form of tax (e.g., excise tax) on all communications companies (equipment suppliers as well as service providers). The example depicted in **Figure 12** contains percentage contribution based on value of shipments or revenues from representative industries.

Figure 12: **Who Pays the Subsidy?**
One Example: Percent Contribution from 1992 Communications Equipment Suppliers and Service Providers



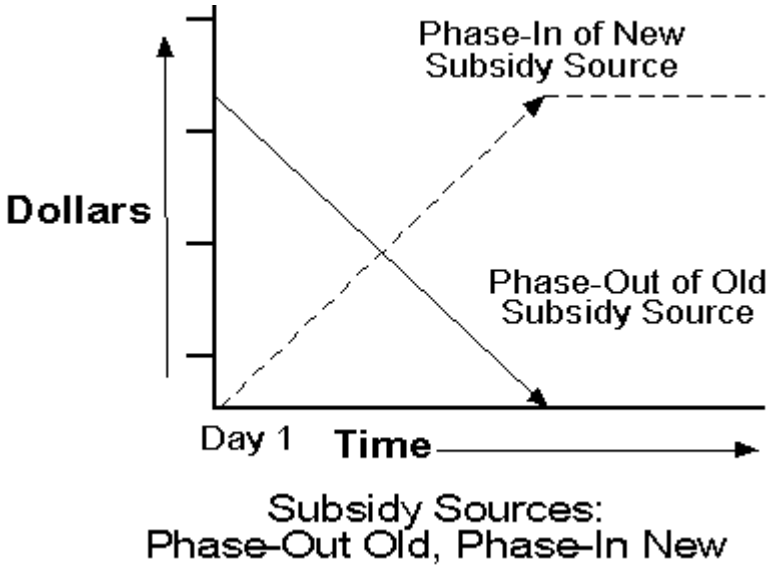
Source: *Universal Service Took Kit, Part 2: Beyond Cost Allocations: Benchmark Subsidy Method*, page 6.

How Do You Phase in the New Subsidy?

Figure 13 depicts a transition from a current subsidy mechanism to a new one. In **Figure 13**, the subsidy is phased out over time and replaced by dollars from a new source. The subsidy amount on the first day of the phase-in is the same as it is on the last day before the transition starts.

On the first day everything looks the same (the straight line with the downward arrow). The phase-in the new mechanism is gradual (the dashed line with the upward arrow). While the phase-in amount is the same as the old subsidy in the figure, in reality the new amount may be more than or less than the old subsidy.

Figure 13: How Do You Phase In the New Subsidy? Phase-Out Old, Phase-In New

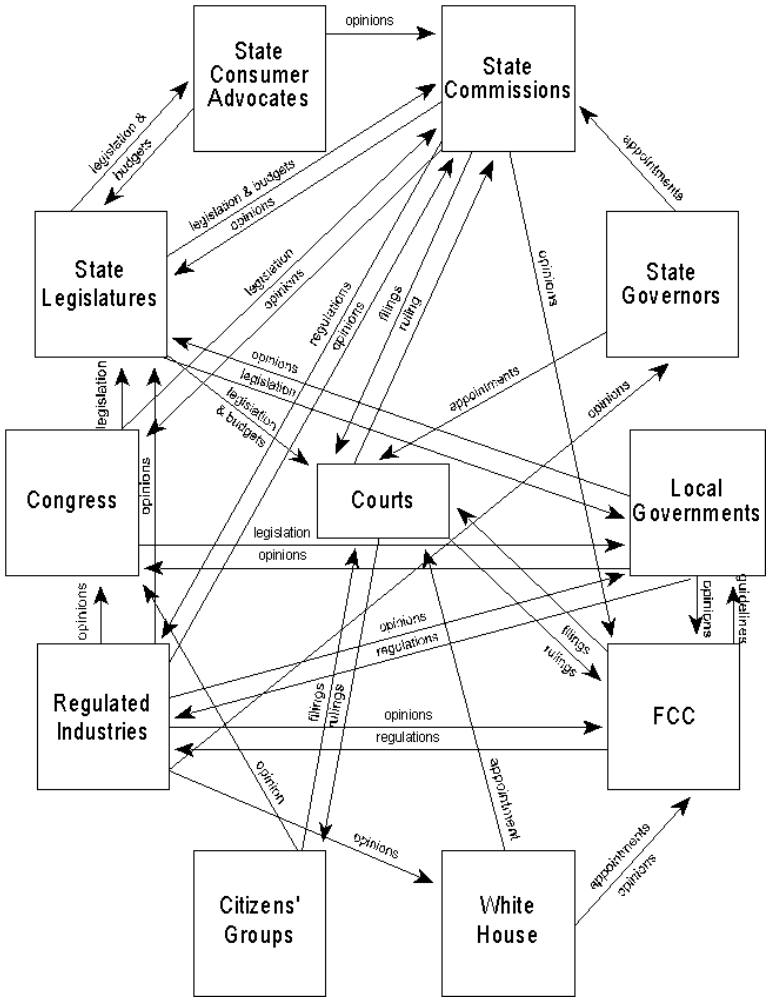


Source: Universal Service Tool Kit, Part 2: Beyond Cost Allocations: Benchmark Subsidy Method, page 6.

Who Decides What in Communications Policy?

Figure 14 indicates why change is so difficult to make. Government agencies and courts overlap. Decisions are repeated by multiple agencies and courts, and sometimes the decisions do not fit with one another. Also, people are able to play one process against another. As a result, it is easier to make small policy changes than to make significant changes that truly alter the political and business landscape. Significant changes are possible only when the most powerful stakeholders agree with one another.

Figure 14: Who Decides What in Communications Policy? It's Hard to Make a Change



Source: Carol Weinhaus, Teresa Pitts, Mark Jamison, et al., *Abort, Retry, Fail? The Need for New Communications Policies*, Telecommunications Industries Analysis Project, Boston, MA, 1994, Figure 13, page 16.

V. Implications of Changing What Universal Service Means

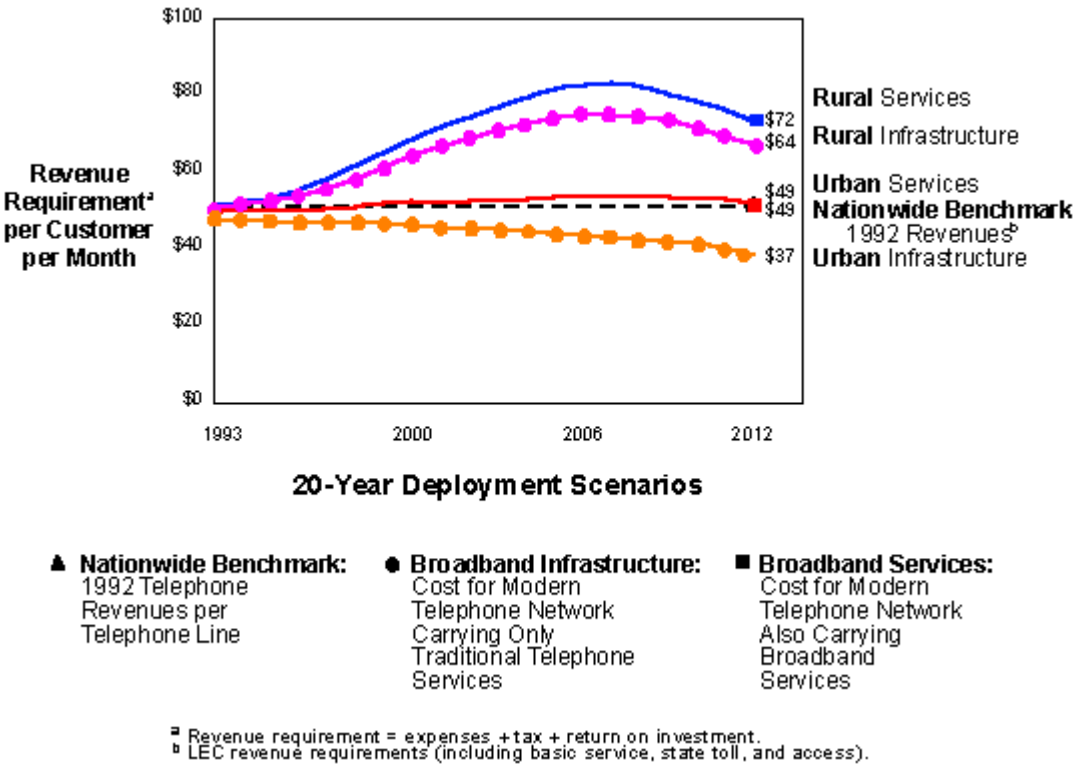
What is the Cost of Expanding the Universal Service Definition to Include Broadband?

Today there is increasing pressure to expand the definition of universal service to include broadband services to all Americans. This is due in part to two major structural shifts that are occurring simultaneously: the shift in market structure from monopoly to competition; and the shift in technology from a single provider to multi-service providers. If technologies were not changing, then policy makers would likely examine subsidies in terms of providers, but would not change what is offered. If markets were not changing, then policy makers would most likely wait until a technology was widely accepted before redefining universal service. However, both markets and technology are changing at the same time. The result is confusion over what can be mandated and what should be market driven.

Figure 15 shows the cost of providing a broadband infrastructure and broadband services for nationwide, urban (metropolitan) and rural markets. The Nationwide Benchmark line in the figure indicates 1992 local exchange carrier operating revenues (including basic service, state toll, and access) per customer per month. It provides a yardstick to give an idea of the magnitude of the costs of deploying broadband.

Figure 15 indicates that the costs of providing broadband services to rural areas are significantly higher than in urban areas. One approach to expanding the definition of universal service is the following: When a service becomes required to conduct daily business or personal activities, this indicates that it is time to include this service in the universal service definition. The definition of basic service expands only when a technology or service has been widely accepted. Touch-tone is an example of a service that in many areas has been included in the definition of basic service. This approach avoids the issue of some customers paying for services that they don't want. It also allows those customers who do want the new services right away to pay for them and take the risk of picking the wrong technology.

Figure 15: **What is the Cost of Expanding the Universal Service Definition to Include Broadband**



[a] Revenue requirement = expenses + tax + return on investment.
[b] LEC revenue requirements (including basic service, state toll, and access).

Note: Assumes a 2.35% annual growth in nationwide access lines. For the Broadband Services curve, each year 5% of broadband-capable access lines also become equipped for Broadband Services. The Nationwide Benchmark of $48.98 is a calculated revenue requirement for Tier 1 local exchange carriers (LECs) divided by the number of access lines for Tier 1 LECs. Costs are for all access lines (broadband-capable plus non-converted).

Source: *Abort, Retry, Fail?,* Figure 2, page 15.

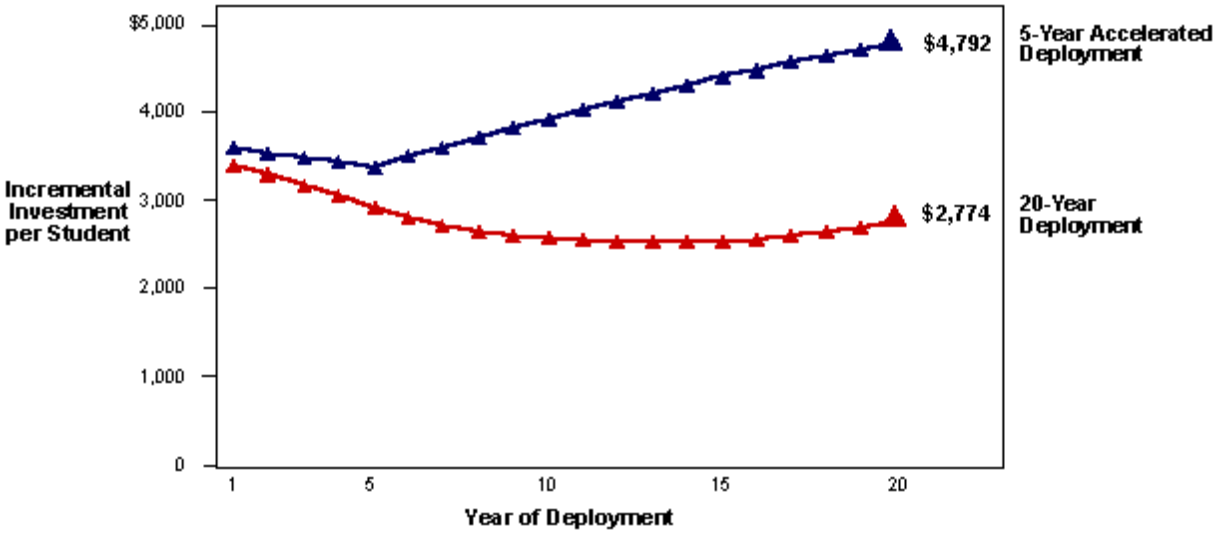
V. Implications of Changing What Universal Service Means, cont.

What Happens If You Mandate a Service Before It's Widely Available?

Figure 16 shows the impact of accelerating the deployment of broadband services (networks, training, equipment, and software) to a subset of the nation. **Figure 16** also shows the incremental investment per student per year needed to provide broadband services over five years and over twenty years to the nation's public schools. Both deployment scenarios assume "Universal Access" (i.e., each student and teacher has a computer). Similar patterns exist in "Teacher Only Access" and "Team of Students Access" scenarios. [6] However, in these cases the costs are significantly lower.

In this example, the result of mandating a definition of Universal Service produces results that are not erased with the passage of time.

Figure 16: **What Happens If Broadband Deployment is Mandated? Incremental Investment per Student per Year for Universal Access to Broadband Services: Public Schools, Kindergarten - Twelfth Grade**



Source: Carol Weinhaus, Teresa Pitts, Linda Garbanati, *et al., Schools in Cyberspace: The Cost of Providing Broadband Services to Public Schools*, Telecommunications Industries Analysis Project, Boston, MA, 1995, Figure 8, page 13.

[6] For more details on this figure, see Carol Weinhaus, Teresa Pitts, Linda Garbanati, *et al., Schools in Cyberspace: The Cost of Providing Broadband Services to Public Schools,* Telecommunications Industries Analysis Project, Boston, MA, 1995.

VI. Summary

Summary

Regardless of your view of subsidies, something has to be done. The current system is crumbling and cannot be sustained under the pressures of new technology and competition. Most people recognize the need for nationwide minimum communications service requirements. These include some voice calling, maintenance and installation, access to emergency services, to operator services, to directory assistance, and to other networks.

In the future, customers may see simple packages of communications services that offer a step beyond the separate telephone, computer, information and entertainment services of today. Some of these packages will offer services that are not currently combined or available. Customers will pick the package that best fits their lifestyle. This view of the future is called *The Information Studio*. [7] Regardless of what form the future takes, one thing is certain: in the future, customers will have more choices and competition will be prevalent. The current Universal Service policies, developed in a monopoly environment, will need to be adapted to fit the competitive environment of the future.

[7] For a complete description of this view of the future, see Carol Weinhaus, Terry Monroe, Mark Jamison, *et al., The Information Studio,* Telecommunications Industries Analysis Project, Boston, MA, August 21, 1995.

Background for Rural Deaveraging Model

Sources for Figure 9:

Price Elasticity Estimate: Lester D. Taylor, *Telecommunications Demand: A Survey and Critique*, Ballinger Publishing Company, Cambridge, MA, 1980, Table 3-1, page 80.

Percent of Households with Telephones: Federal Communications Commission, Common Carrier Bureau, *Telephone Subscribership in the U.S.*, November 1992, Table 2, page 18.

Assumptions and Caveats for Figure 9:

There would need to be a transition mechanism.

The only objective addressed is universal service. Income transfers and costs of doing business are not considered.

Figure 9 shows a nationwide average; it does not show extremes. Customers in areas that have higher than average costs would likely require support that exceeds this average. Customers in lower cost areas would likely require less support than the average, or perhaps no support.

The $0.7 billion represents an upper bound for the following reasons:

- The number of customers assumed to receive support is an upper bound. This assumption is based on the highest customer response to changes in local service prices found in Taylor's survey of telephone demand studies. [8] Using Taylor's data, the assumption is that a 10% increase in price results in a 2% decreases in purchases. The lowest customer response shown in Taylor's survey was one-fourth of this estimate - a 0.5% decrease in purchases in response to a 10% increase in price.

- Financial support for both local and toll were included. It is possible that both services would not need to be supported because customers can limit their toll bills themselves by placing fewer calls.

- All customers receiving financial support were assumed to need support at the current level. Some would probably need less support.

Rural and urban customers have similar demand curves for local telephone service.

Telephone penetration for rural households is the same as the national average.

A mechanism can be designed to target customers that need support - similar to Lifeline and Link-up programs. (For a discussion of these calculations and sources, see Carol Weinhaus, Sandra Makeeff, Peter Copeland, *et al., What is the Price of Universal Service? Impact of*

[8] See Taylor, *Telecommunications Demand*:, Table 3-1, page 80.

Deaveraging Nationwide Urban/Rural Rates, Center for Telecommunications Management at the University of Southern California School of Business Administration, Boston, MA, pages 16 and 38.)