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November 13, 1992

Mr. Steve Tribble
Director, Records and Reports
Florida Public Service Commission
101 East Gaines Street
Fletcher Building, Room 111
Tallahassee, FL 32399

RE: Comprehensive Review of the Revenue Requirement and Rate Stabilization Plan of Southern Bell Telephone & Telegraph Company, Docket No. 920260-TL

Dear Mr. Tribble:

Enclosed for filing in the above-referenced case are the original and 15 copies of the Direct Testimony of Mark Cooper, with Exhibits, which are being filed on behalf of the American Association of Retired Persons ("AARP").

Thank you for your assistance in the processing of this filing, and please call if there are any questions or further requirements.

Sincerely,

Bill L. Bryant, Jr.

/rf

Enclosure

cc: Parties of Record

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by U.S. Mail or Hand Delivery this 13th day of November, 1992.

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SOUTHERN BELL TELEPHONE AND TELEGRAPH COMPANY

DOCKET NO. 920260-TL

DIRECT TESTIMONY OF

MARK N. COOPER

ON BEHALF OF

THE AMERICAN ASSOCIATION OF RETIRED PERSONS

FILED: NOVEMBER 13, 1992

TESTIMONY OF MARK N. COOPER

I. QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, ADDRESS AND OCCUPATION.

A. Dr. Mark N. Cooper, President, Citizens Research, 504 Highgate Terrace, Silver Spring Maryland 20904. I am also Director of Research of the Consumer Federation of America (CFA). My testimony reflects my personal views and not those of CFA.

Q. WHAT IS YOUR EDUCATIONAL BACKGROUND?

A. I hold a Ph. D. in Sociology from Yale University, an M.A. in Sociology from the University of Maryland, and a B.A. in English from the City College of New York.

Q. PLEASE BRIEFLY SUMMARIZE YOUR RELEVANT EMPLOYMENT EXPERIENCE AND RESEARCH INTERESTS.

A. Prior to founding Citizens Research, a consulting firm specializing in economic, regulatory and policy analysis, I spent four years as Director of Research at the Consumer Energy Council of America. Prior to that I was an Assistant Professor at Northeastern University teaching courses in Business and Society in the College of Arts and Sciences and the School of Business. I have also been a Lecturer at the Washington College of Law of the American University co-teaching a course in Public Utility Regulation. I am also the author of Energy and Equity: Rising Energy Prices and the Living

Standards of Lower Income Americans (Westview, 1982).

Q. HAVE YOU PREVIOUSLY TESTIFIED ON THESE AND RELATED ISSUES?

A. I have testified on various aspects of telephone rate making before the Public Service Commissions of Pennsylvania, the District of Columbia, Georgia, Kentucky, Manitoba, Maryland, Delaware, Florida, Iowa, Vermont, Washington, South Carolina, Illinois and Ohio as well as the Federal Communications Commission and the Canadian Radio and Telephone Commission.

I have presented testimony in Manitoba, Mississippi, and North Carolina dealing with cost and price issues, as well as universal service, drop off and lifeline issues. I have presented testimony before the Federal Communications Commission and in South Carolina dealing with universal service and the burden that rising telephone rates place on lower income households. I have presented testimony in Ohio and New York in lifeline proceedings and dealt with universal service and lifeline issues.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. On behalf of the American Association of Retired Persons I have reviewed the company's proposal to institute a lifeline program. I have reviewed the testimony of Nancy Simms (pp. 17-18), as well as Attachment No. 1, p. 83.

While I support the establishment of a lifeline rate, I find the company's proposal to be inadequate. The eligibility standard is too restrictive. There is no proposal to conduct outreach efforts to ensure the success of the program. There is no monitoring mechanism. The proposed funding level is grossly inadequate. Because the program is so poorly thought out and designed, the company's program would fail miserably. Therefore, in my testimony I present a comprehensive conceptual and empirical analysis of the need and justification for a lifeline program as well as the structural characteristics necessary to ensure that the lifeline rate will accomplish its goals.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.

A. Section II presents a conceptual definition of universal service and discusses empirical evidence which supports this definition. This section demonstrates a need for a lifeline program. The empirical evidence clearly indicates that we should view the telephone as a necessity which is used to meet basic needs of daily communications. It shows that universal service, even defined as basic access, has not been achieved. It shows that because of the important role of the telephone in daily life, access alone is not a measure of affordability. Finally, the burden that having a phone

places on the budget of low income households should be considered as well. Section III presents four justifications for the program.

These include accounting, economic, regulatory and social justifications. It shows that there are a number of accounting, economic cost and economic benefit reasons that justify the program within the traditional and evolving telecommunications policy in the state. The program can be defended as compensating for weaknesses in cost allocation that unfairly attribute costs to low income households. It can be defended as efficiency-oriented, demand sensitive pricing. It can be defended as efficiency-oriented, externality-capturing pricing. It is clear that the public policy responsibility places this type of pricing within the scope of the commission. Cost/benefit analysis also indicates that implementing the policy through the rate structure is fair. Ultimately, the program could be justified as social policy.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. I recommend that the lifeline discount be set equal to the Federal subscriber line charge, to achieve the full social externality available to the state. I recommend enrollment in any of the major public assistance programs (AFDC, Medicaid, Food Stamps, SSI) or income below 125

percent of poverty as the eligibility criteria to reach the needy population and that segment most likely not to have telephone service. I recommend self-certification with periodic, partial verification to check on enrollment, to achieve the highest penetration and keep administrative costs down. I recommend vigorous outreach efforts to ensure program success. I show that the revenue foregone would be small -- in the neighborhood of $6.3 million per year -- and that the rate should be blended into normal ratemaking as simply another tariff available.

II. CONCEPTUALIZING AND MEASURING UNIVERSAL SERVICE

Q. HOW DO YOU DEFINE UNIVERSAL SERVICE?

A. The definition of universal service that I utilize has three components -- access to the phone, use of the phone, and affordability. Universal service is the ability of all households to have and use a phone at rates that do not strain the household budget. Access is typically defined as the dial tone -- having the phone in the home. Use of the phone is defined as the actual placing of calls. Affordability of the phone is a less precise concept, frequently measured by estimating the percentage of income that households spend on telephones.

Q. WHY DO YOU REFUSE TO DEFINE UNIVERSAL SERVICE AS SIMPLE ACCESS TO THE TELEPHONE?

A. I regret a narrow definition of universal service as simple access to the phone because the telephone is a necessity and people will cling to it. Even if households do not drop off the network, we must still ask whether they are able to use the phone as the basic means of communication in the last quarter of the twentieth century. For the past half century we have woven the phone into the fabric of daily life. We have let decisions about where to live, where to locate services, how to acquire information, and how to allocate our time be fundamentally influenced by the ease of access to unlimited local calls. The telephone has become the mainstay of daily communications. While it is easy to conceive of a way of life in which the telephone does not play this vital role, it is not the way of life we live in this country.

At the same time that we ask whether households are able to use the phone, we must also ask whether the cost of having and using the phone places a strain on the household budget. It does not suffice to say that if a household has a phone it must be affordable, regardless of how much of a burden it places on the household budget. Affordability is more complex than that. In this context the test of affordability is not simply whether or not people keep the phone, or whether or not

they use it, but how much of a burden a decent level of consumption of this vital necessity places on the household budget.

Households will continue to subscribe to the network because the phone is a necessity, but if they are forced to pay more for this necessity and reduce their consumption of other necessities, then the phone is not truly affordable. It is seriously diminishing the living standard of the household.

Q. DOES YOUR ANALYSIS OF TELEPHONE PENETRATION RATES INDICATE THAT UNIVERSAL ACCESS HAS BEEN ACHIEVED?

A. Not at all. Although there has been an ongoing debate about whether the percentage of households with telephone service has been increasing or decreasing, the simple fact is that there remains a dramatic difference between low income and non-low income households in their ability to afford telephone service.

Based on the March 1991 Current Population Survey approximately 93 percent of all households in Florida have telephone service, but an examination of the data shows a very uneven pattern of penetration rates. Almost one-quarter (23 percent) of households with annual incomes below $2,500 do not have telephones. Almost one-fifth of those with income between $2,500 and $7,500 do not have a telephone. In contrast, less than one percent

of those who have incomes above $50,000 per year do not have telephones. Only two percent of those with incomes between $30,000 and $50,000 do not have telephones. Attachment MNC-1 plots the general relationship between income and penetration rates. Since virtually everyone in Florida who is not severely income-constrained has a telephone, I believe that virtually everyone would have a telephone if they could afford it. Based on this data, I conclude that universal availability of service has not been achieved and that a key reason is the inability of low income households to afford the service.

Q. DOES THE EMPIRICAL EVIDENCE THAT YOU REVIEWED ON THE PATTERNS OF USE OF THE TELEPHONE SUPPORT YOUR CONCEPTION?

A. I believe that the observable patterns of behavior with respect to the telephone indicate that people treat the use of the telephone as a necessity.

Evidence from the nation at large shows that the average user makes about 110 - 120 local calls per month (see Attachment MNC-2). The average duration is about 4.5 minutes. About three quarters of all households make less than 150 calls per month and about three quarters of all calls are less than 5 minutes in length. The phone is in use for local calls an average of less than 20 minutes per day.

Of Special importance is the numbers of calls deemed

necessary (see Attachment MNC-3). In a major national study I helped to conduct, low income households deemed about 70 telephone calls per month to be necessary. The average number of calls deemed essential by all households was 88 calls per month.

If you think of telephone calls not as a luxury but as functional communications in modern society, three to four calls a day is truly a small number. The basic business of daily life -- a call to a store, to the doctor, to school, or to a sick friend -- certainly demands three to four calls per day, and that is what most subscribers use it for.

Lower income households make fewer calls and consider a smaller number to be necessary, but the difference between total calls for a random sample compared to low income households is larger than for calls deemed necessary. The total population reports making and receiving 36 percent more calls per week but only 23 percent more necessary calls per week.

It is also clear that households not on the network have much lower levels of utilization of telecommunications. They make only one quarter as many calls (total and necessary) as households on the network. They receive very few calls.

These households overwhelmingly want service and the

primary reason they do not have it is that they cannot afford it (see Attachment MNC-4, p. 18). The majority experiences problems because of lack of telephone service and perceives a benefit from telephone service (Attachment MNC-4, pp. 32-36).

Q. PLEASE DEFINE THIS CONCEPTUALIZATION OF ACCESS AND USE AS COMPONENTS OF UNIVERSAL SERVICE IN STANDARD ECONOMIC TERMS?

A. These observations on the nature of the telephone and its use can be briefly summarized by a familiar economic measure -- the elasticity of demand. This gauges the rate at which demand changes in response to a change in price.

The elasticity of demand is measured as the percentage change in demand that occurs in response to a one percent change in price. Demand elasticities are generally negative. When prices increase, demand decreases (conversely, when prices decrease, demand increases). Telephone demand elasticities are small. A one percent increase in price will cause a reduction in demand which is less than one percent. In the case of the telephone, it is considerably less than one percentage point. It has become widely acknowledged that the elasticity of demand for access (availability) is very low. Increases in price elicit very small reductions in demand.

It turns out, however, that the elasticity of demand for use is also quite low. The demand response to usage price increases are somewhat larger than those for access but still quite small. People do not want the telephone as an alarm box. They apparently want it as a means of communications which requires being able to use it. Several dozen studies have been made of the price elasticity of demand for access and use in this country and abroad. These include both cross sectional studies of cities and households and longitudinal studies of specific states.

Attachment MNC-5 presents estimates of the elasticity of demand for access and use from a number of studies that dealt with the residential sector separately. About half a dozen of these have been used in rate proceedings. It can be generally concluded that the long run elasticity of demand for access is in the range of -.01 to -.2 and the long run elasticity for use is about in the range of -.2 to -.4. That is, all other things equal, a ten percent increase in the price of access results in about a one percent decrease in demand for access. A ten percent increase in the price of use results in about a three percent decrease in the demand for use. Lower income households have been found to have considerably higher elasticities of demand.

Q. HOW DO YOUR OBSERVATIONS ON DEMAND FOR ACCESS AND USE AFFECT THE ANALYSIS OF AFFORDABILITY?

A. The low demand response to price increases for both access and use means that one cannot analyze the third aspect of universal service -- affordability -- with reference only to the reduced access charge. One must recognize that households will struggle to keep and use the telephone at levels fairly close to the average in order to have a level of communications commensurate with a decent standard of living.

Assessing affordability in this context means that the test of affordability is not simply whether or not people keep and use the phone, but how much of a burden a decent level of consumption of this vital necessity places on the household budget. For this reason, making access and use more affordable for poor households that already have service should be considered a part of the goal of universally affordable service.

Q. DO PATTERNS OF EXPENDITURES FOR TELEPHONE SERVICE SUPPORT THIS CONCEPTION OF THE AFFORDABILITY PROBLEM?

A. Yes. Because telephone service is a necessity, it becomes more and more difficult to reduce consumption as income declines. That is, poorer households will try to spend less for this commodity at lower levels of income, but they find it more and more difficult to do so because

it is a necessity. As a result, we observe that at each lower level of income, expenditures for this commodity rise as a percentage of income, although they fall in absolute value. Households are forced to spend a larger share of their income on telephone service to maintain their well-being.

The most recent comprehensive source of evidence is the Consumer Expenditure Survey of 1988-89 (CES). Attachment MNC-6 shows a graphic representation of the expenditures for telephone service. The conclusion one draws from Attachment 6 is overwhelmingly clear. Expenditures for telephone service exhibit the pattern that would be expected for necessities. At lower levels of income, households are forced to spend a much larger percentage of their income on basic utilities.

Households with incomes less than $5,000 spend about 15 percent of their income on telephone service. Households with incomes between $5,000 and $10,000 spend just under 5 percent of their income on telephone service. This drops off rapidly as income rises -- around 3 percent for those with incomes in the $10,000 to $20,000 range; around 2 percent for those with incomes in the $20,000 to $40,000 range and less than 1 percent for those with incomes above $50,000.

Q. IS THE AVAILABLE ECONOMETRIC EVIDENCE CONSISTENT WITH THE

INTERPRETATION OF THE TELEPHONE AS A NECESSITY?

A. The formal econometric analysis of elasticities can be interpreted to make the point that we are dealing with a necessity. We have observed that demand elasticities are low. It turns out that income elasticities -- the response of demand for telephone service to changes in income -- are generally positive but less than one and larger than the price effects. This gives the telephone the price and income elasticities we expect from a necessity.

Because the price elasticity is low, consumers have difficulty substituting for this commodity when its price increases. Yet, because the income elasticity is high relative to the price elasticity, it indicates a large decrease in utility with a price increase.

"When substitution effects are large relative to income effects, consumers can substitute away from goods whose prices have risen with little loss in utility. However, when income effects are large relative to substitution effects, an increase in price means a relatively large decrease in utility. Since the income effect is indicated to be large relative to the substitution effect in the price elasticity of demand for access for households with low income, particularly if they are young, the welfare of these households may be

significantly decreased by increase in the price for basic service." Lester Taylor, Telecommunications Demand: A Survey and Critique (Cambridge Massachusetts: MIT Press, 1980, p. 82.)

Q. PLEASE SUMMARIZE YOUR VIEWS ON THE NATURE OF THE TELEPHONE AS A COMMODITY.

A. The empirical evidence clearly indicates that we should view the telephone as a necessity which is used to meet basic needs of daily communications.

It shows that universal service, even defined as basic access, has not been achieved. It shows that because of the important role of the telephone in daily life, access alone is not a measure of affordability.

Finally, the burden that having a phone places on the budget of low income households should be considered as well.

III. JUSTIFICATION

Q. HOW DOES THE EVOLUTION OF THE NETWORK POSE A PROBLEM FOR THE ULTIMATE ACHIEVEMENT OF UNIVERSAL SERVICE?

A. In addition to the fact that universal service has not been achieved, I believe that a serious threat to ultimately reaching the goals of universal service is emerging which demands an immediate response. This threat constitutes my first justification for the program. I refer to this as the accounting

justification.

In the past decade the phone company has begun to shift its focus from the provision of basic telecommunications services -- the ability to place and receive voice grade calls -- to providing enhanced services. The emphasis has shifted to capital deepening, which is not necessary to meet the demand for basic voice grade communications. Modernization of the network and provision of enhanced services is a laudable goal, but it is not the only goal of the system. The costs of modernization must not be borne by those who seek only to meet their basic needs for daily telecommunications through the network.

Q. HOW DOES COST ALLOCATION COMPOUND THE PROBLEM OF MODERNIZATION?

A. This would be of no concern to users of basic residential services if the costs were being fully borne by the users who are causing it to be installed.

The allocation of the costs and benefits of each piece of equipment deserves close scrutiny because the network is now pursuing multiple goals. I believe that rigorous cost accounting would shift costs from the residential sector, in general, and the low income segments of the residential sector in particular, to other sectors. In the new period of capital deepening an effort must be made to identify the costs imposed on the network more

carefully for precisely defined classes of consumers. The lifeline program I am proposing is designed to ensure that the goal of universal service is not compromised by the subsidiary goal of providing enhanced services and moving into the information age.

I believe that rigorous cost-causative analysis will show that low income consumers impose fewer costs on the network. They have less of the more exotic or specialized demands that have been imposing costs on the system. The extremely expensive design and engineering criteria of the network have been imposed on the system to meet the needs of services other than basic local exchange. Attachment MNC-7 presents a recent report prepared for AARP, on which I assisted, which provides a detailed historical explanation of this cost allocation problem. It shows that residential subscribers have disproportionately paid for system upgrades compared to the benefits that they derived from those improvements. This argument applies to all residential subscribers. However, it should apply even more forcefully to lower income households since they are disproportionately not users of the more exotic services. In light of the fact that universal service has not been achieved, it is especially important that modernization expenditures and costs not be allowed to further delay accomplishment of

the primary goal of the network. A lifeline program is one way to ensure that this does not happen.

Q. WHAT IS THE BYPASS JUSTIFICATIONS FOR THE LIFELINE PROGRAM?

A. Much of the recent thrust for price changes in the telephone industry stems from an assertion that companies must price their toll and enhanced services to avoid revenue erosion from competition -- bypass of the network.

These arguments seem to have lost sight of the simple fact that lower income households can be driven off the network too. Judging by penetration rates, the greatest current bypass of the network occurs among low income households. The arguments used to justify differential pricing for price sensitive business customers apply equally, if not with more force, to low income households.

If low income households are driven off, or prevented from joining the network, investment in the facilities that serve them is stranded. Since this investment is not quickly written off, it can be a burden to other ratepayers. Insofar as lines are in place, I believe that a very good case could be made that the low income households should be incrementally priced. If they are properly priced, they can be induced to stay on the

network and make a contribution to fixed costs.

Q. HOW DO EXTERNALITIES JUSTIFY THE LIFELINE PROGRAM?

A. There are two economic externalities that indicate that ratepayers would be better off with a lifeline program. An externality arises when the action of one person affects the welfare of another person in a way that is not reflected in the market prices.

First, ratepayers derive a benefit from having a larger network. The more people one can reach, or be reached by, the more value the network has. Businesses in particular benefit from a denser network. I call this the direct, network externality of increased penetration rates.

Second, society in general benefits from the expansion of the network. As members of society are able to contact each other more efficiently, the overall welfare of society increases. Individuals are more productive. In some cases, public health is improved. For example, prenatal care is frequently dispensed by telephone. Better prenatal care can avoid many health problems -- increasing the health of individual members of society. I call this the indirect or social externality of an increased penetration rate. Some of these benefits may result in a lowering of costs to members of society. Increasing productivity and improving health may lower

health care costs or the costs of other social program that are paid by taxpayers. Thus, although ratepayers are charged a little more as a result of the lifeline program, they get significant benefits as ratepayers and taxpayers.

Given the Federal decision to match local lifeline discounts up to the amount of the federal subscriber line charge, this indirect externality has been increased. Because of the manner in which the federal matching funds are raised, there is a net transfer of funds into the state. For every dollar shifted in revenue requirement, there is a two dollar increase in the resources available to households enrolled in the program, but transfers within the state are less than two dollars. Thus, the impact of the program on their productivity, health, etc. is multiplied to the good, from the ratepayer and taxpayer point of view.

Q. ON WHOM SHOULD THE REVENUE BURDEN FALL AND HOW SHOULD BENEFITS BE DISTRIBUTED?

A. In light of the above discussion we must be concerned about how to ensure that the externalities are captured and what impact they have on the analysis of economic efficiency and social equity.

Economic theory generally suggests that lump sum taxes are the way to raise funds for a lifeline program and

monetary transfer payments dispersed through public assistance programs are the way to distribute the resources. However, the unique nature of the phone system dictates otherwise.

Simply making welfare checks larger, if that were a possibility, would not necessarily capture the full benefits of the lifeline program. The direct external benefit of the telephone is a true externality. That is, network value is not necessarily optimized when individuals optimize their personal welfare. Some people would take the increase in their income but not join the network. They would allocate their resources according to their personal needs. The ratepayers who could benefit from a denser network would not derive the full benefit of the program because the penetration rate would not be raised to the optimum.

Because individuals do not take the true externality into account in making their personal choices, it is not clear in this case whether the total welfare of the members of society would be maximized by allowing individuals to make free choices with increased welfare payments. This would argue for a commodity specific program like a telephone voucher to ensure that the external benefits are captured.

Given the small costs associated with running a commodity

specific program through the rate structure and the externality gains of increasing penetration, we might conclude that a lump sum transfer from the treasury to the phone system to make up the revenue shortfall from lowered rates for eligible households would be optimum. Rates for the target group would be lowered, but rates for others would not be raised.

However, the network externality introduces another complexity.

Q. WHY DOES THE NETWORK EXTERNALITY SUGGEST THAT RATEPAYERS SHOULD PAY, RATHER THAN TAXPAYERS?

A. Only ratepayers benefit from the network externality. The benefit is neither universal nor is it fungible -- only people on the network enjoy it and it can only be enjoyed in the form of increased communications. Funding a program to increase penetration rates through the tax structure constitutes a transfer of welfare from some taxpayers who derive no such benefits to ratepayers who do derive this benefit. Their loss of welfare may not be offset -- in an efficiency sense -- by the gains in welfare of ratepayers. Because of the network externality, aggregate efficiency and equity are served best by a transfer from ratepayers delivered to eligible households through the rate structure.

Q. WHY DO YOU BELIEVE THAT THE PUBLIC SERVICE COMMISSION HAS

THE RESPONSIBILITY TO IMPLEMENT UNIVERSAL SERVICE POLICY, INCLUDING ISSUES SUCH AS WHETHER AND HOW TO SET UP A LIFELINE?

A. I believe the responsibility of the Public Service Commission to undertake this policy determination goes back to the fundamental nature of local telephone service. Local service remains a monopoly service delivered under a franchise granted by the people. The Commission is the official body designated to regulate telecommunications utilities.

This body is also the repository of expertise in utility and telecommunications policy in the state. It has a staff and advisors that specializes in the issues and matters involved in universal service.

Q. HAVE LIFELINE PROGRAMS BECOME A PART OF TELEPHONE PRICING POLICY?

A. Yes. With the shift of emphasis in most telephone companies from provision of basic services to modernization and provision of enhanced services and with recent increases in rates, many jurisdictions have begun to consider and adopt lifeline programs.

In telecommunications, universal service is a national goal adopted by the Communications Act of 1934. The purposes of the Act included the following:

For the purpose of regulating interstate

> and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all people of the United states a rapid, efficient, Nation-wide and world-wide wire and radio communication service with adequate facilities at reasonable charges.
> Communications Act of 1934.

Exactly what the language means has been the subject of some debate, but the decision of the Federal Communications Commission to institute lifeline programs was linked directly to this goal of the Communications Act.

"The preservation of universal service is a basic goal of this Commission. To further that goal, we adopted the recommendation of the CC Docket 80-286 Federal-State Joint Board to establish a federal assistance program, generally known as the Lifeline Assistance Program. That program helps low-income households stay on the network by providing matching assistance to subscribers receiving benefits under a qualifying state or local telephone company assistance plan. Qualifying subscribers are exempted from the monthly subscriber line charge when federal assistance is matched by state benefits. Later we adopted further recommendations of that Joint Board to

create a federal connection assistance program known as "Link Up America." The Link Up program is designed to encourage low-income households to subscribe to local exchange service by reducing high connection charges." Federal Communications Commission, Notice of proposed Rulemaking, CC Docket No. 88-341, June 23, 1988, page 2. The language in the Florida statute gives similarly high prominence to the achievement of affordability. The first purpose of the public service commission is to: "Protect the public health, safety, and welfare by ensuring that basic telecommunications service are available to all residents of the state at reasonable and affordable prices." F.S. 1991, Chapter 364.01, Telephone Companies, P. 887.

The law does not define available or affordable, but it does construe service "in its broadest terms."

Q. ARE THERE NON-ECONOMIC JUSTIFICATIONS FOR THE PROGRAM?

A. Having made the argument that the lifeline program has several strong economic justifications, it is still important to reiterate the social justification. If a subsidy is involved in the lifeline program, it can still be justified on social grounds.

As a society we do not restrict ourselves to simple economics. For reasons of human decency we are willing to create programs that transfer wealth and, in the

strict sense, reduce economic efficiency. I have defined a decent standard of living in our society to include meeting the needs for daily communication at rates that do not erode a household's budget. I believe that the decision to embrace universal service as a goal and to consider lifelines entails a decision to make such a trade-off.

Q. PLEASE SUMMARIZE YOUR DISCUSSION OF JUSTIFICATION FOR THE PROGRAM.

A. I have shown that there are a number of accounting, economic cost and economic benefit reasons that the program is justified within the traditional and evolving telecommunications policy in the state.

The program can be defended as compensating for weaknesses in cost allocation that unfairly attribute costs to low income households.

It can be defended as efficiency-oriented, demand sensitive pricing. It can be defended as efficiency-oriented, externality capturing pricing.

It is clear that the public policy responsibility places this type of pricing within the scope of the commission.

Cost/benefit analysis also indicates that implementing the policy through the rate structure is fair.

Ultimately, the program could be justified as social policy.

IV. PROGRAM DESIGN

Q. PLEASE BRIEFLY DESCRIBE THE STRUCTURE OF LIFELINE PROGRAMS AND THE CRITERIA BY WHICH THEY SHOULD BE EVALUATED.

A. In designing the program, I address four fundamental questions.

What criteria should be used to determine eligibility for the program?

How should the eligibility of any individual be ascertained and verified?

At what level should rates be set?

How should the program be administered and paid for?

The program should strive to achieve maximum impact while being economically and administratively efficient as well as equitable. Both benefits and costs should be allocated as equitably as possible. To meet these goals, I propose the following program elements.

I propose that any household currently enrolled in or eligible for any of the four major public assistance programs -- Aid to Families with Dependent Children, Supplemental Security Income, Food Stamps, or Medicaid -- be eligible for the lifeline program.

Self certification of eligibility, with periodic auditing of recipients, is cost-effective for administering the program.

For recurring charges I recommend that eligible households receive a $3.50 discount on the monthly service access charge to capture the full value of the federal subscriber line charge waiver.

Vigorous efforts to promote program participation should be carried out.

Q. WHO SHOULD BE ELIGIBLE FOR THE PROGRAM?

A. Keeping in mind that the goal of the program is to maximize the size of the network and relieve the burden that having a phone places on household budgets, I recommend that the program be targeted to households who are currently enrolled in or eligible for any of the four major public assistance programs -- Aid to Families with Dependent Children, Supplemental Social Insurance, Medicaid and Food Stamps. These programs cover the major general assistance programs for young and older households, as well as the major commodity specific assistance programs.

Households eligible for these services are obviously low income households. The empirical evidence indicates that low income households are the households who are most likely to drop off the network as a result of rising prices.

Q. IS THERE EVIDENCE ON THE NATURE OF THESE HOUSEHOLDS AND THEIR TELEPHONE SUBSCRIBERSHIP?

A. Yes, the Current Population Survey provides a great deal of useful information.

These are certainly the households that are more likely to not have telephone service, as Attachment MNC-8 shows. Overall, about one-in-five households enrolled in these programs does not have a telephone. This is about the penetration rate observed for households with incomes below $5,000. The program targeted at the elderly (SSI) has a higher penetration rate, while those aimed at younger households (AFDC) have a lower penetration rate. This reflects well-known age related tendencies to subscribe to phone service.

These households are also clearly needy. Approximately 64 percent of those enrolled in one of these programs has an income below 125 percent of poverty. Approximately 79 percent had incomes below 200 percent of poverty.

However, the participation rate in these programs is not very high, as Attachment MNC-9 shows. Only about half of all households in the state with incomes below poverty are enrolled in one of these programs. Less than a quarter of those with incomes between poverty and 125 percent of poverty are enrolled. About one-in-ten of those with incomes between 125 percent and 200 percent of poverty are enrolled. Relying only on program enrollment misses a large part of the needy population.

I believe that the eligibility criteria for the lifeline program should be either enrollment in one of the four major programs or income below 125 percent of poverty. The former would make 11.5 percent of the households in the state eligible. Because so many poor people are not enrolled in these programs, the latter would make an additional 10.5 percent of the households in the state eligible.

Q. WHY DO YOU SETTLE ON 125 PERCENT OF POVERTY?

A. As attachment MNC-10 shows, this would make over one-half of all households without telephone service eligible for the lifeline program. Up to 125 percent of poverty, the households are disproportionately without telephone service. Earlier we saw that these households are also significantly more likely to be enrolled in one of the four programs. If the income cut-off were extended to 200 percent of poverty, it would cover three quarters of those without telephone service, but include many households who are not typically considered eligible for public assistance.

In essence, choosing the 125 percent of poverty cut-off lies as the intersection of two characteristics -- lack of telephone service and eligibility for assistance.

Q. HOW SHOULD ELIGIBILITY BE DETERMINED?

A. Self-certification coupled with partial auditing would be

the most cost effective mechanism. Administrative costs associated with excessive verification unnecessarily incurred are a waste of resources that detract from the program. Stigma associated with onerous reporting or verification requirements may prevent eligible households from seeking to enter the program, thereby reducing the significant social and economic benefits that a lifeline program would provide. As I propose the program, its benefits are small and they are not in the form of cash. The incentives to cheat are also consequently small.

It is generally felt that certification and verification requirements can have an impact on participation. Onerous requirements are potential barriers. A study I conducted for AARP indicates that this is the case (see Attachment MNC-11). States which rely on the individual or self certification have participation rates that are almost twice as high as those which do not.

For purposes of auditing, the company can periodically compare the names of those enrolled in the lifeline program to the public assistance rolls. The costs of such a comparison are extremely small -- typically a few cents per enrollee. A small sample of those claiming low income, but not enrolled in any of the criteria programs, can also be audited for eligibility.

Q. HAVE OTHER STATES ADOPTED SUCH AN APPROACH?

A. Yes, a number of states like Minnesota and Michigan have adopted similar approaches. Attachment MNC-12 provides background materials from these states. This approach has been acceptable to the FCC as a means test. Therefore, the federal match will be available.

Q. ARE OUTREACH EFFORTS NECESSARY TO SUPPORT THE PROGRAM?

A. Yes. Given the fact that participation in assistance programs is far from total, it is necessary to conduct outreach efforts, especially for a new program. My analysis shows that media-based approaches which rely on television or radio are associated with lower levels of participation (see Attachment MNC-13). Inserts and brochures (not prepared by telephone companies) are associated with higher rates of participation. The participation rate for programs that include written promotion is approximately 1.5 times that of those that rely on radio and TV only.

There are a number of other factors that should be considered. First, foreign language materials are extremely important in a state like Florida. Outreach at places where the target population can be encountered should also be considered -- senior citizen centers, shopping malls, etc. Finally, the company should monitor the success of the program carefully. The commitment to making the lifeline program work should be just as strong

as its commitment to successfully marketing new services, since achieving universal, affordable service is the primary goal of the franchise.

Q. IS YOUR PROPOSED LIFELINE RATE TIED TO THE PRICE CAP PLAN?

A. Not at all. A lifeline rate is justified regardless of the approach that the Commission takes to regulating profits or rates for specific services. There is no logical or economic relationship between the lifeline rate and the price cap plan.

Q. HOW WOULD YOU RECOVER THE REVENUE REQUIREMENT CREATED BY THE LIFELINE RATE?

A. For the purpose of traditional rate making, the lifeline rate becomes another element in allocating the revenue requirement. Since earnings currently are excessive, the lifeline program would have no immediate impact on rates. The lifeline rate would simply absorb some of the current excess.

Q. HOW MUCH OF THE SURPLUS DOES THE LIFELINE RATE ACCOUNT FOR?

A. In order to estimate the revenue foregone as a result of the lifeline rate, we must estimate the number of households which are likely to enroll in the program. According to the eligibility criteria I recommend approximately 22 percent of the households in the state

would be eligible. I estimate that 30 percent of these would enroll in the first few years (see Attachment MNC-14), if Florida performs at the national average.

The Company serves approximately half of the state. Therefore, I estimate approximately 172,000 enrollees (see Attachment MNC-15). Assuming a $3.50 state discount, the total revenue requirement created would be $7.2 million. It would be lower in the first year, but might be higher in later years.

Q. ARE THERE OFFSETS TO THIS REVENUE REQUIREMENT?

A. Yes, the lifeline program would increase revenues in a number of ways.

The lifeline program would increase the number of subscribers and these will contribute incremental revenues. That is, the lifeline rate is well above variable or incremental costs.

Once these subscribers are on the network they also tend to generate intralata long distance calls, which make further contributions to fixed costs. Therefore, adding subscribers makes a contribution to fixed costs.

All households enrolled in the program will experience an increase in their income. These household may also increase their intralata use, further increasing their contribution.

Detailed cost and demand studies would be necessary to

as certain the size of this contribution. It does not take much to generate significant offsets, however. For example, in a proceeding similar to this I estimated the contribution of new subscribers at $5.00 per month. Assuming a 3 percent increase in low income households on the network, the contribution would be about $1 million, almost one-seventh of the revenue requirement. Thus, on an ongoing basis, the revenue shift would be about $6.2 million.

Q. BEYOND THE CURRENT CONDITIONS OF EXCESS REVENUE, HOW SHOULD THE LIFELINE RATE BE FUNDED?

A. Lifeline customers should be treated as any other groups of customers. Their rate should be set at a discount equal to the Federal Subscriber Line Charge. The number of subscribers should be multiplied by the amount of monthly charge to identify the revenue stream generated by the groups of subscribers. That should simply go into the overall projection of revenues. Similarly, their intralata toll usage will be counted as part of the company's projections for this stream of revenues. In this way, the lifeline program is independent of the specific form of profit regulation and does not require any special treatment in ratemaking. It is simply another tariff available.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. I recommend that the lifeline discount be set equal to the Federal subscriber line charge, to achieve the full social externality available to the state. I recommend enrollment in any of the major public assistance programs (AFDC, Medicaid, Food Stamps, SSI) or income below 125 percent of poverty as the eligibility criteria to reach the needy population and that segment most likely not to have telephone service. I recommend self-certification with periodic, partial verification to check on enrollment, to achieve the highest penetration and keep administrative costs down. I recommend vigorous outreach efforts to ensure program success. I show that the revenue foregone would be small -- in the neighborhood of $6 million per year -- and that the rate should be blended into normal ratemaking as simply another tariff available.

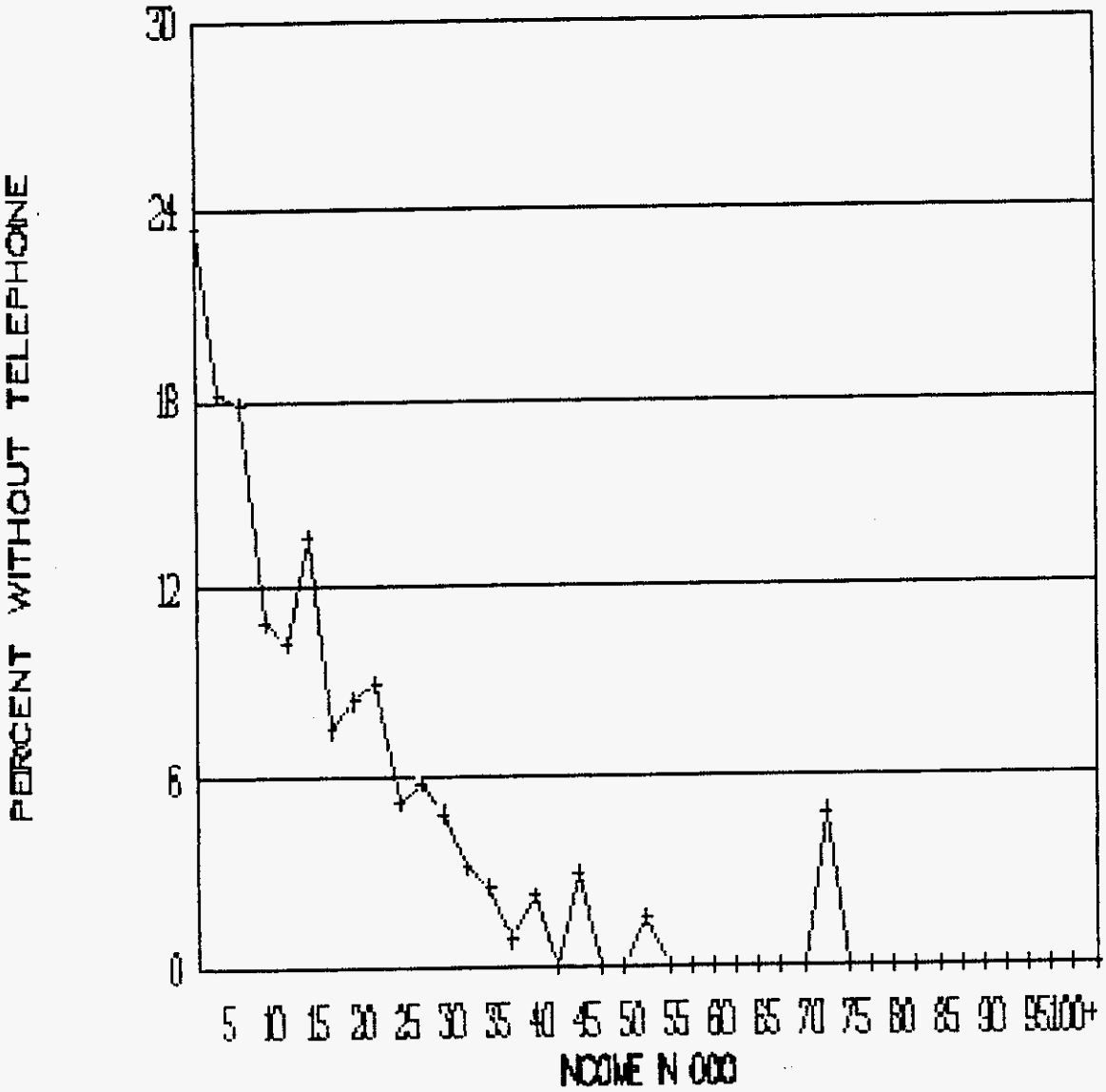
Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

ATTACHMENTS

ATTACHMENT MNC-1

PERCENT OF HOUSEHOLDS IN FLORIDA WITHOUT TELEPHONE SERVICE



U.S. Department of Commerce, Bureau of the Census, Current Population Survey, March 1991, Florida

ATTACHMENT MNC-3

NUMBER OF CALLS MADE AND DEEMED ESSENTIAL PER WEEK

	NATIONAL SAMPLE			
	TOTAL POPULATION		LOW INCOME (L.T. $10,000)	
	TOTAL	ESSENTIAL	TOTAL	ESSENTIAL
CALLS MADE TO:				
FRIENDS	18	7	13	6
RELATIVES	9	5	9	5
BUSINESSES	6	6	4	4
TOTAL	36	22	27	18
CALLS RECEIVED FROM:				
FRIENDS	16	6	11	5
RELATIVES	7	4	6	4
BUSINESS	4	4	2	2
TOTAL	28	15	20	12

	CALIFORNIA, FLORIDA AND TEXAS			
	RANDOM SAMPLE		OFF THE NETWORK	
	TOTAL	ESSENTIAL	TOTAL	ESSENTIAL
FRIENDS	18	6	3	2
RELATIVES	8	5	2	2
BUSINESSES	7	4	2	2
TOTAL	36	29	9	7
CALLS RECEIVED FRO				
FRIENDS	18	5	1	1
RELATIVES	6	4	1	1
BUSINESS	4	4	0	0
TOTAL	34	25	2	2

SOURCE: Mark N. Cooper, The Telecommunications Needs of Older, Low Income and General Consumers in the Post-Divestiture Era, American Association of Retired Persons and Consumer Federation of America, October, 1987.

ATTACHMENT MNC-2

THE NUMBER AND DURATION OF CALLS PLACED

AREA OF STUDY	AVG. NO. OF CALLS	MEDIAN NO. OF CALLS	AVG. DURATION IN MINUTES
NATIONAL	117 - 144	93	4.50
ILLINOIS	88 - 122	NA	4.00
UTAH	122	NA	4.00
MISSOURI	NA	117	NA
OHIO	NA	81	4.00
OHIO BELL 1FR	139	NA	4.91
OHIO BELL	31	NA	6.25
GTE (USS)	47	NA	3.71

SOURCES: SEE NEXT PAGE.

NATIONAL: Lawrence Garfinkel and Peter Linehart, "the Revenue Analysis of Local Measured Service," Public Utilities Fortnightly, October 9, 1980, except, 144, which is from Mark N. Cooper, The Telecommunications Needs of Older, Low Income and General Consumers in the Post-Divestiture Era, American Association of Retired Persons and Consumer Federation of America, October, 1987.

ILLINOIS: G.F. Wilkinson, "The Estimation of Usage Repression Under Local Measured Service: Empirical Evidence from the GTE Experiment," in L. Courville, A. De Fontenay and R. Dobell (Eds.), Economic Analysis of Telecommunication: Theory and Applications (New York: North Holland, 1983); R.E. Park and B.M. Mitchell, Charging for Local Telephone Calls (Santa Monica: The Rand Corporation, 1982).

UTAH: Richard M. Oveson, Telephone Usage in Utah: A Consideration of Alternative Offerings, submitted by Mountain Bell, Northwestern Bell, and Pacific Northwest Bell in FCC Docket No. 83-788.

MISSOURI: Bruce L. Egan, "Direct Testimony on Behalf of South Western Bell," before the Public Service Commission, State of Missouri, PSC No. TR-83-253; submitted as Attachment 1 to Comments of Southwestern Bell Telephone Company, FCC Docket No. 83-788.

OHIO: Clark A. Mount-Campbell, Jouh B. Neuhardt, and Baumin Lee, A Descriptive Study of Telephone Usage in Ohio (The National Regulatory Research Institute, September, 2987).

OHIO BELL: Ohio Bell Case No. 81014330-TP-AIR, Office of Consumers' Counsel. Request for Production of Documents and Interrogatories #2.

GTE: "Response to Requests for Data and Interrogatories, OCI-177," The Public Utilities Commission of Ohio, Case No. 87-1307-TP-Air

ATTACHMENT MNC-4

Mark N. Cooper, The Telecommunications Needs of Older, Low Income and General Consumers in the Post-Divestiture Era, American Association of Retired Persons and Consumer Federation of America, October, 1987.

THE TELECOMMUNICATIONS NEEDS OF OLDER, LOW INCOME AND GENERAL CONSUMERS IN THE POST-DIVESTITURE ERA

A PUBLIC INTEREST PERSPECTIVE ON RECENT SURVEY RESEARCH

PREPARED BY

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FOR

THE AMERICAN ASSOCIATION OF RETIRED PERSONS

AND

THE CONSUMER FEDERATION OF AMERICA

OCTOBER, 1987

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EXECUTIVE SUMMARY

THE ORIGIN AND PURPOSE OF THE REPORT

This report presents a review of public interest group telecommunications policy in light of the recent outpouring of research about telecommunications. The central focus is on the concept and policies these groups advocate in support of universal service.

The database reviewed includes approximately 5,500 interviews conducted in mid-1986 -- the majority of which come from a joint project of American Association of Retired Persons, The Consumer Federation of America, and American Telephone and Telegraph. In addition, surveys of respondents in Michigan, Arizona, Utah and Virginia are reviewed, as is recent data compiled by the Bureau of the Census and the Bureau of Labor Statistics.

UNIVERSAL SERVICE: AFFORDABILITY

The premise of public interest telecommunications policy is that telephone service is a necessity for every American household. Concern about the affordability of service has focused both on households without service and on low income and elderly households for whom the cost of service may create a budgetary strain. Among the key findings which support this public policy concern are the following.

Households without telephones are an especially low income segment of the population and lack of service is overwhelmingly a low income problem.

- Two-thirds of all households without service had incomes below $15,000 per year and over four-fifths had incomes below $25,000.

- Lack of service is overwhelmingly the result of an inability to afford service and large front end costs are the primary obstacle to access to the network.

Although, there is no simple, objective measure of the burden that rising telephone rates place on households, a standard approach to gauging the burden that the consumption of necessities places on the budgets of low income households has been to calculate the percentage of income spent for the necessity. By this measure, the burden on low income households with telephone service has become heavy.

- For the poorest fifth of the population, telephone bills accounted for just over 6 percent of income in 1980/81 and 1982/83. Telephone expenditures accounted for 3 percent of the income of the second quintile of the income distribution and only 2 percent for the wealthiest fifth of the population.

- As a result of large local rate increases in 1984 telephone expenditures as a percentage of income increased sharply for the lowest income group -- to almost 9 percent. It increased much less dramatically for the other income groups.

UNIVERSAL SERVICE: UNDERSTANDING TELEPHONE USE

Public interest groups view telephones as a basic necessity of daily life. Necessity is defined as not merely having access to the phone. Use of the phone is also of utmost importance. The data support this view of the telephone in a variety of ways.

Respondents with telephone service report that a fairly large number of calls were made and received.

- Combining local and long distance calls, respondents report making an average of 36 calls per week, approximately 144 per month.

- Low income and older respondents with telephones report making about one-quarter fewer.

- Households without telephones make a much lower number of calls, around 10 per week.

Even though the general population reports many more total calls than the older and low income households with phones, there is a much smaller difference in the number of calls deemed essential.

- The respondents to the national survey deem about 22 calls per week essential (3 per day). Elderly and low income households in that sample deem 17 to 18 calls per week essential.

- Virtually none of the respondents say they make no essential calls and over four-fifths say they make one or more essential calls per day.

These data may shed light on the social underpinnings of consumer resistance to local measured service. Most plans for measured service offer much lower levels of calls for which there is not a separate charge. Frequently, in the past, proposals for

measured service have meant that consumers would have higher bills at present levels of usage.

The data also demonstrate that in addition to making and receiving far fewer telephone calls, the overwhelming majority of households who desire telephone service but do not have it experience problems as a result of the lack of service.

- Eighty percent of the problems encountered by households without service concern emergencies, lack of communication, safety and work.

INFORMATION AND PRODUCTS IN THE NEW TELECOMMUNICATIONS INDUSTRY

The survey results reviewed in this study raise concern about the ability of consumers to exercise effective choices in choosing telephone services, about the distribution of costs and benefits and about pressures that have been placed on the price of basic service in the emerging telecommunications industry:

- Although consumers are generally aware of the changes in the telecommunications industry, pricing and product information are a critical area in which consumers express difficulty in obtaining information.

- Usage of the telephone for special services shows that low income and elderly households are not well situated to reap the benefits of the "information age."

RECENT CHANGES IN TELEPHONE RATES AND BILLS

The data on post-divestiture prices for telephone service indicate consumers are bearing a heavier burden.

- The majority of households spend more for subscriber line charges than they save on the resulting reductions in long distance rates and much more for local service;

- Local bills have increased dramatically since divestiture. Combining local rate increases, subscriber line charges and long distance usage rate reductions, the average residential bill is up considerably, at approximately twice the rate of inflation.

I. INTRODUCTION: UNIVERSAL SERVICE POLICY IN THE NEW TELECOMMUNICATIONS ENVIRONMENT

THE ORIGIN AND PURPOSE OF THE REPORT: TESTING PUBLIC INTEREST GROUP TELECOMMUNICATIONS POLICIES WITH RECENT SURVEY DATA

In early 1986 the American Association of Retired Persons (AARP), the Consumer Federation of America (CFA), and American Telephone and Telegraph (AT&T) joined together to conduct the largest combined public interest/industry research project in the history of the telecommunications industry, perhaps any industry.1/ The goal was to create a data base large enough and, as a result of the joint public interest/industry involvement, credible enough to answer some fundamental questions about the new telecommunications industry. Dramatic changes in the industry had created an urgent need for this type of data.

The separation of local from long distance service -- the break up of the phone company -- was not only the largest corporate reorganization in the history of the country, but it came in an industry that most public interest groups and many in the industry believe delivers a necessity. While the promise of divestiture -- more products delivered in a more efficient and attractive fashion -- is always welcomed by consumer groups, deep consumer concerns were felt about the impact of divestiture and increasing deregulation on universal availability of basic telephone service.

Both AARP and CFA had clear and specific policies relating to telecommunications prior to the research project. Some of these policies had existed for years, others had been worked out in the wake of divestiture. All are subject to constant review and possible change. A primary purpose of the research for the public interest organizations involved was to test the premises and

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1/ American Association of Retired Persons, Consumer Federation of America and American Telephone and Telegraph, Joint Telecommunications Project (hereafter, joint project), February 12, 1987.

conclusions of their existing policies against a large, objective data base.

This report examines the fundamental tenets of the AARP and CFA policies (which are similar) in light of the joint project, as well as other recent survey evidence. While there are a few surprises, the evidence overwhelmingly supports our general view of the telephone as a vital necessity. In particular, it supports our view of the need for universal service, which is the central issue examined in this report.

PRIOR TO THE EARLY 1980s PROGRESS TOWARD ACHIEVING UNIVERSAL SERVICE WAS STEADY AND THE ISSUE RECEIVED LITTLE PUBLIC POLICY ATTENTION

The national policy of achieving universal telephone service was originally defined in the National Communications Act of 1934. As defined in the Act, the goal was

> To make available, so far as possible, to all people of the United States, a rapid, efficient, nationwide, and worldwide wire and radio communications service with adequate facilities at reasonable charges.1/

For almost five decades this policy caused little debate and prompted no additional federal legislation. In large measure there was steady progress toward universal service. For half a century technological advances lowered the real price of phone service while national income grew, rendering telephone service more and more affordable (see Figure I-1). AT&T, with a virtual monopoly on long distance service and the franchise to provide the overwhelming majority of local service, was technologically advanced and financially sound, while the percentage of households with telephone service (referred to as the penetration rate) increased steadily.

1/ Communications Act of 1934, 73rd Congress, Second Session, June 19, 1934.

FIGURE I-1:
THE REAL PRICE OF TELEPHONE SERVICE

CONCERN OVER UNIVERSAL SERVICE EMERGED AS A RESULT OF DIVESTITURE AND CHANGES IN REGULATORY POLICY

In the early 1980s, however, three factors converged to stimulate discussion of the goal of universal service:

1. The divestiture of AT&T -- the separation of local from long distance service,

2. Policy shifts at the federal and state levels that sought to change the pattern of pricing telephone service -- the federal subscriber line charges for long distance and efforts to impose local measured service;

3. The achievement of a national average penetration rate of over 90 percent.

Many public interest groups supported divestiture by AT&T -- the separation of long distance service and the telecommunications equipment business from local service. The belief was that consumers would benefit by breaking up the telephone company to separate the monopoly portion of the business -- local service -- from other aspects of telecommunications which could be competitive. The theory was that by introducing competition in parts of the industry that could be truly competitive, consumers could receive lower prices and a wider range of choices, and the industry might become more innovative and efficient.

Public interest groups also had concerns about divestiture. One immediate concern was that divestiture might raise the cost of basic telephone service. The break-up of AT&T required the allocation of costs and revenues between the local and long distance parts of the business. Intense concern was expressed about the potential impact that this could have on local rates. For example, the Federal court overseeing the divestiture allocated Yellow Pages, a highly profitable part of the overall company, to the new local companies to help assure their financial stability and soundness.

At the same time, the new local companies came before state

public service commissions asking for very large rate increases. They argued that the change in the telephone industry had created a riskier environment which necessitated higher returns to the telephone company and higher rates for consumers.1/

The federal subscriber line charge -- a monthly charge for each telephone line for access to the long distance network, which was offset by reductions in charges for usage of the long distance network -- also clearly added to the cost of access to the network. Would rising prices force households off the network? Local measured service raised questions about the meaning of universal service. Would the movement toward measured service lead to changes in usage patterns that would deny some consumers effective use of the network?

The achievement of over a 90 percent penetration rate was certain to raise questions about the ultimate goal of universal service. With the 1980 census reporting that only 7.1 percent of all households did not have telephone service, a public policy discussion of how high the percentage could go was inevitable. With such a small percentage of households not having service, questions about who did not and why not were clearly in order.

Whatever the cause or justification, concern about local rates and universal service were well-founded. Even without the subscriber line charge, in the three years after divestiture, local rates increased faster than general inflation.2/ Including the subscriber line charge, the price of access to the network increased even more dramatically, almost four times the rate of inflation.

1/ Mark N. Cooper, Local Rate Increases in the Post-divestiture Era: Excessive Returns to Telephone Company Capital (Consumer Federation of America, September 1986).

2/ Gene Kimmelman and Mark Cooper, Divestiture Plus Three (Consumer Federation of America, December 1986) and Industry Analysis Division, Summary of State Telephone Rate Cases (Federal Communications Commission, October 21, 1986).

Moreover, the increase in the national penetration rate of telephone service ceased. For a period there was even a decline.1/

PRIOR RESEARCH ON UNIVERSAL SERVICE WAS VERY SCANT

Alone, any of these events might have stimulated a lively discussion of universal service. Together they triggered a very intense debate. Yet, because this policy had not been a prominent public issue for such a long time, the basic underlying data and information necessary to make decisions were lacking. While a number of econometric studies of the relationship between the demand for service and price or income had been conducted (elasticity studies), almost no detailed research existed into fundamental questions.

The bulk of the research done prior to divestiture relied on aggregate data from telephone company records (total sales, lines in service, etc.) and general Census or Bureau of Labor Statistics data on the population.2/ A few surveys existed, but these were

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1/ The Bureau of the Census did not include a question on telephone subscription in the 1970 census and prior to 1983 such a question was not asked in the Current Population Survey. The FCC has commissioned the asking of a question since 1983, but the wording differs slightly from the 1980 census.

2/ Many of the more elaborate studies were placed in evidence before the Federal Communications Commission, In the Matter of the Petition of the State of Michigan Concerning the Effects of Certain Federal Decision on Local Telephone Service, CC Docket no. 83-788, February 24, 1983. The models can be found in the submissions of Southwestern Bell Telephone Company, the New York Department of Public Services, Michigan Bell Telephone Company, and the State of Connecticut Department of Public Utility Control.

A review of many additional studies can be found in Lestor D. Taylor, Telecommunications Demand: A Survey and Critique (Cambridge: 1980).

limited in size and/or issues covered.1/

A GREAT DEAL OF DATA HAS RECENTLY BECOME AVAILABLE WITH WHICH TO STUDY UNIVERSAL SERVICE RELATED ISSUES

Beginning in 1984 and particularly in late 1985, analysts began to compile survey data that tied the characteristics of individual households directly to their telephone bills and usage characteristics.2/ These surveys dealt with consumer attitudes about service, patterns of use and perceptions about the nature and use of telephones. This data provides a more qualitative understanding of telephone subscription in contemporary society.

By the end of 1986 a much larger body of data existed. This included the first studies of households without telephones, which are are inherently difficult to survey.3/

This report reviews the results of a number of these studies. The central set of data analyzed is the recent joint study undertaken by AARP/CFA/AT&T. This study (referred to as the joint project) is by far the largest of its kind (see Table I-1).

1/ Belinda Brandon (ed.), The Effects of the Demographics of Individual Households on Their Telephone Usage (Cambridge: 1981); Gary P. Mahan, The Demand for Residential Telephone Service (Michigan State University: 1979); and Benjamin Singer, Social Functions of the Telephone (Palo Alto, 1981).

2/ Pacific Bell, Residence Customer Usage and Demographic Characteristics Study (1985); Washington State Public Service Commission, Disconnection from the Local Telephone Network (1985); Public Utility Law Project, Survey of Low Income Telephone Usage, 1985; American Association of Retired Persons, Nationwide Survey of Older Americans (1985).

3/ The fact that most surveys are conducted by telephone underlines the difficulty of reaching households without phone service. Three methodologies have been applied to locate households without phone service: 1) random walk throughs of neighborhoods supported by various levels of sampling methodology; 2) identification of residences without active service from telephone company records; and 3) screening of potential state surveys of low income households and households headed by older individuals with phone service, three state surveys of households without service and a survey of disabled individuals.

TABLE I-1:

SAMPLE SIZES OF RECENT SURVEYS OF TELECOMMUNICATIONS NEEDS AND USE

	TARGET POPULATION			
	WITHOUT PHONES	LOW INCOME	ELDERLY	GENERAL POPULATION
GEOGRAPHIC AREA				
NATION-WIDE	NA	NA	NA	1003
CALIFORNIA	210	202	200	NA
FLORIDA	192	205	200	NA
TEXAS	172	202	200	NA
NEW YORK	NA	200	200	NA
VIRGINIA	618	NA	NA	431
MICHIGAN	145	408	NA	NA
ARIZONA	202	NA	NA	NA
UTAH	134	NA	NA	NA
TOTAL	1673	1208	800	1434

SOURCES: NATIONAL, CALIFORNIA, FLORIDA, NEW YORK AND TEXAS, AMERICAN ASSOCIATION OF RETIRED PERSONS, CONSUMER FEDERATION OF AMERICA, AMERICAN TELEPHONE AND TELEGRAPH, JOINT TELECOMMUNICATIONS PROJECT (JOINT PROJECT), FEBRUARY 12, 1987, NATIONAL, STATE AND OFF THE NETWORK SAMPLES.

ARIZONA AND UTAH, REPLY OF MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY, NORTHWESTERN BELL TELEPHONE COMPANY AND PACIFIC NORTHWEST BELL TELEPHONE COMPANY IN THE MATTER OF MTS AND WATS MARKET STRUCTURE FEDERAL COMMUNICATIONS COMMISSION, CC DOCKET NO. 78-72, 80-286, OCTOBER 9, 1986.

VIRGINIA. DEPARTMENT OF MARKETING, VIRGINIA TECH, LIFELINE TELEPHONE SERVICE: A STUDY PERFORMED FOR THE VIRGINIA TELEPHONE ASSOCIATION OCTOBER, 1986.

MICHIGAN, MICHIGAN CITIZENS LOBBY, LOW INCOME HOUSEHOLDS IN THE POST-DIVESTITURE ERA: A STUDY OF TELEPHONE SUBSCRIBERSHIP AND USE IN MICHIGAN, PREPARED FOR THE MICHIGAN DIVESTITURE RESEARCH FUND, OCTOBER, 1986.

Over 3,300 interviews were conducted. In addition to a national random sample, samples of specific target populations were interviewed in four states (New York, California, Texas and Florida). Appendix B provides a brief description of the methodology of the joint project.

The four other surveys discussed in this review were conducted during the same time period of mid-1986. They included over 2,000 additional respondents, representative of various target populations in four states: Michigan,1/ Arizona,2/ Utah,3/ and Virginia.4/

Reference will also be made to surveys of price and penetration rates conducted by the Bureau of Labor Statistics (BLS)5/ and the Census Bureau.6/ While these surveys do not provide a great deal

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1/ Mark N. Cooper, Low Income Households in the Post-Divestiture Era: A Study of Telephone Subscribership and Use in Michigan, prepared by Michigan Citizens Lobby for the Michigan Divestiture Research Fund, October, 1986.

2/ Reply of Mountain States Telephone and Telegraph Company, Northwestern Bell Telephone Company and Pacific Northwest Bell Telephone Company in the Matter of MTS and WATS Market Structure, Federal Communications Commission, CC Docket No. 78-72 and 80-286, October 9, 1986.

3/ Ibid.

4/ Department of Marketing, Virginia Tech, Lifeline Telephone Service: A Study Performed for the Virginia Telephone Association, October, 1986.

5/ Bureau of Labor Statistics, Consumer Price Index, reported monthly. These reports have been analyzed in detail by the Federal Communications Commission. The most complete report in the series is James L. Lande and Peyton L. Wynns, Primer and Sourcebook on Telephone Price Indexes and Rate Levels (Common Carrier Bureau, April, 1987).

6/ Bureau of the Census, Current Population Survey, reported semi-annually. The trend in penetration rate after divestiture is analyzed by the Federal Communications Commission in a series of reports. The most complete report in the series is Alexander Belinfante, Telephone Penetration and Household Characteristics for 1986 (Common Carrier Bureau, March 26, 1987).

of qualitative information, they are used to corroborate key quantitative findings of the other surveys. The BLS and Census data are based on very large samples and are considered to be authoritative for many purposes.

LIMITATIONS AND STRENGTHS OF THE DATA

The attitudinal surveys cited in this report are typical primarily telephone survey research conducted at present. The general limitations of such surveys should be kept in mind.

The surveys embody perceptions and attitudes recorded in response to specific questions. There is always uncertainty in such survey research because respondents may interpret individual questions differently.

Moreover, some questions attempted to obtain factual information from respondents -- e.g., demographics, telephone usage, telephone bills. Reporting of these facts by respondents may not be accurate. In some cases it is possible to verify such data. With the exception of a few questions in the Michigan survey and one question in the joint project survey, we know of no effort to verify such information.

The fact that these surveys are conducted at one point in time also places limits on what they can tell us. The telecommunications industry is changing rapidly and questions about current attitudes or even perceptions of past changes may not reflect actual changes or predict future conditions well.

All of the surveys entailed some random sampling. However, several introduced randomness after a significant self-selection process occurred. For example, about half of the Michigan survey was based on interviews with individuals in social service offices (the other half was based on randomly selected telephone respondents). A survey of disabled individuals, conducted as part of the joint project, was carried out through sampling of attendees at various meetings and conferences of disabled

persons.

Although qualitative detail was sought in some of the surveys, this study is not one of the culture of the telephone -- its role and function in the lives of different segments of society. Nor is it a comparative study of recent telecommunications developments in different nations. It is a quantitative study intended to answer basic questions such as

> What are the characteristics of households without service compared to low income households with service and the general population?
>
> Why do some households have telephone service and some not and what problems does a lack of service cause?
>
> How many calls do households make? Who do they call and which types of calls do they consider essential?
>
> Do people understand the new telecommunications environment?
>
> Which groups are likely to benefit from the creation of new telecommunications products?
>
> How have price changes affected residential consumer bills and what is the burden of telephone bills on low income households?

For these purposes, the combined data set on which this report is based may be unique in recent survey analysis. Perhaps because the fundamental problem had not been researched for so long, perhaps because the aforementioned factors focused so much attention on the question of universal service, perhaps because of a combination of the two, an unprecedented outpouring of research took place. This research provides a very broad data base for answering a host of crucial questions about the new telecommunications environment.

II. UNIVERSAL SERVICE: AFFORDABILITY

THE PREMISE OF PUBLIC INTEREST TELECOMMUNICATIONS POLICY IS THAT TELEPHONE SERVICE IS A NECESSITY; CONCERN ABOUT THE AFFORDABILITY OF SERVICE HAS FOCUSED BOTH ON HOUSEHOLDS WITHOUT SERVICE AND LOW INCOME AND ELDERLY HOUSEHOLDS FOR WHOM THE COST OF SERVICE MAY BE A BUDGETARY STRAIN

The concern with universal service has generally focused on two distinct groups who are seen to be at risk:1/

1) Households that do not have telephones but desire them and are deemed to be suffering serious deprivation; and

2) Households with telephones for whom the expense might create a hardship, generally defined as low income households.

Older Americans, who tend to have telephones in their homes in much higher proportions than the national average, have been a focal point of concern not only because of their limited income, but also because their limited mobility and declining health make the telephone critical for communications. Combining the fact that older people are much more likely to have service than the average household with the fact that they have lower incomes than the national average only points to the extreme importance of phone service to them. This underscores the possibility that rising prices, or changing pricing patterns, may impose a hardship on this group.

Because telephone service is such a necessity, the mere fact that a household has a telephone does not demonstrate that it is affordable. Households may strain their budgets to keep it.

1/ Joint project Summary, Universal Service, p. 4.

HOUSEHOLDS WITHOUT SERVICE AND LOW INCOME/ELDERLY HOUSEHOLDS WITH SERVICE EXHIBIT SHARPLY DIFFERENT CHARACTERISTICS

The AARP/CFA/AT&T data indicate two distinct populations that are potentially at risk in meeting their telecommunications needs. The group which was identified as not having telephones is quite different from the group defined as low income.

The heads of households without service tend to be much younger than the average respondent in the general survey. In contrast, the low income population with service tends to be older than the average respondent.

For example, in the general survey (which includes a randomly sampled number of older households and low income households), heads of households older than 65 make up 16 percent of the respondents in California, 12 percent in Florida and 19 percent in Texas (see Figure II-1).1/ Among those without service, many

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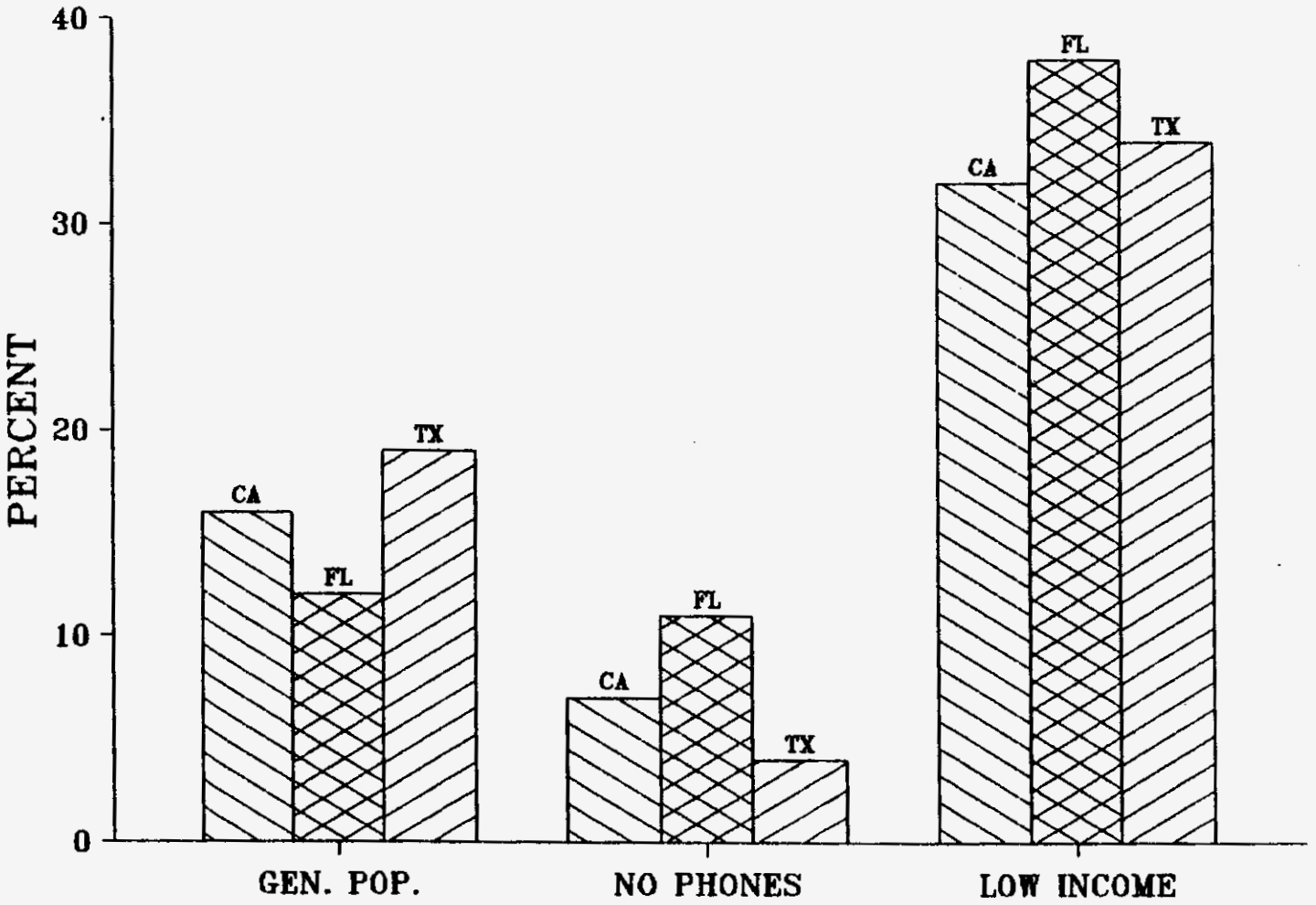
1/ Throughout the analysis, reference is made to the general survey or general population. These are the respondents who were randomly selected in the national survey. In the course of conducting a national random sample one encounters a large number of low income households (defined for these purposes as those with incomes below $10,000) and older Americans (defined throughout this analysis as those over 65 years of age). In the joint project 6.5 percent of the respondents were both older and low income; 4.8 percent were low income but not older; and 11.9 percent were older, but not low income. In making comparisons we refer to the general population, which includes these proportions of older and low income respondents. If comparisons were made between low income/older and non-low/non-older (rather than the general population), most differences observed between the low income/older and the general population would be increased and conclusions reinforced.

Throughout the analysis we refer to unweighted data. Parts of the joint project generated weighted data, but most of the other projects did not report weights. To maintain comparability, unweighted data is used throughout and projections to the overall population are avoided, except where census data is available. Our analysis shows that traditional weights developed on the basis of census data are also inappropriate because of the vast differences between low income households with and without telephone service.

FIGURE II-1

PERCENT OF POPULATION OVER 65



fewer households were headed by a person over 65 (7, 11, and 4 percent, respectively). A much larger percentage of low income households (defined as households with incomes below $10,000 per year) were headed by a person over 65 (32, 38 and 34 percent, respectively).

HOUSEHOLDS WITHOUT TELEPHONES ARE AN ESPECIALLY LOW INCOME SEGMENT OF THE POPULATION

The median age of household heads in the general survey population is in the early 40s (see Table II-1). The median age of the heads of households without phones is in the early to mid 30s. Among low income households, the median age is in the early 50s.

Those without phones tend to be less educated than the average respondent. The median grade completed in the general survey population is just above 12 (some college). Among households without telephones the median is considerably less than 12 (varying from 7 to 11). Low income households with phones tend to be better educated than those without telephones, but not as well educated as the general population with telephones.

Households without phones are somewhat larger than the average (well over three people per household). Low income households with phones are considerably smaller than the average (less than two per household).

Households without phones are much more likely to be unemployed and on public assistance than respondents to the general survey. Their median income is about one-third that observed in the general survey.

These households also tend to be more mobile than the general population. In five of the states where surveys of households without phones were conducted, the average length of residence at the current address was less than one year, in the sixth (Florida) it was just under two years. The national average length of residence is close to five years.

TABLE II-1:

DEMOGRAPHIC CHARACTERISTICS OF THE GENERAL POPULATION
COMPARED TO HOUSEHOLDS WITHOUT TELEPHONES

	MEDIAN AGE (in Years)		EDUCATION (Highest Grade)		AVG. HH SIZE		% NOT EMPLOYED		% ON WELFARE		MEDIAN INCOME (THOUSAND $)	
	GEN. POP.	NO PHONE	GEN. POP.	NO PHONE	GEN. POP.	NO PHONE	GEN. POP.	NO PHONE	GEN. POP.	NO PHONE	GEN. POP.	NO PHONE
CAL.	43	30	13.3	9.7	3.0	3.7	NA	34	21	49	30.0	9.4
FLA.	42	35	13.5	7.0	3.0	3.7	NA	34	14	48	25.0	11.1
TEX.	44	30	12.0	7.7	3.0	3.9	NA	31	21	42	30.0	10.5
VA.	43	35	12.2	9.6	NA	NA	28	40	5	40	25.0	6.8
MICH.	NA	31	NA	11.3	NA	2.7	NA	83	NA	68	NA	5.5
UTAH	NA	30	NA	NA	3.2	3.4	NA	34	NA	NA	24.6	9.1
ARIZ.	NA	32	NA	NA	2.6	2.5	NA	24	NA	NA	NA	10.2

SOURCES: See Table II-1.

In the three states surveyed in the joint project for households off the network, approximately 47 percent of the respondents had moved within the last year. The national average is less than 17 percent.

LACK OF SERVICE IS OVERWHELMINGLY A LOW INCOME PROBLEM

The data also make clear that lack of phone service is a low income problem. Approximately two-thirds of all households identified in the joint project random sample of households without phone service and approximately one-half of those in the current population survey (CPS) without phones had incomes below $10,000. Over four-fifths identified in the joint project and almost two-thirds in the CPS as not having phones had incomes below $15,000. Approximately 94 percent in the joint project and 81 percent in the CPS had incomes below $25,000. Thus, the lack of phone service is overwhelmingly a problem of the low income population.

LACK OF SERVICE IS OVERWHELMINGLY THE RESULT OF AN INABILITY TO AFFORD SERVICE

The argument that households without phone service do not want it and are spending their money on other things is clearly contradicted by this data.

The overwhelming majority of households without service say they want it, but cannot afford it (see Table II-2). This is especially true of lower income households without service.

In California, Florida and Texas, about 20 percent of the respondents without phones said that they did not want a telephone. Among low income respondents without phones, only about 15 percent said they did not want service. In Arizona, Utah, Michigan and Virginia, the percentage of households without phones who say they do not want service is also small, ranging from 4 percent to 21 percent, with an average of 13 percent.

The overwhelming majority of those without a phone that want one say that expense is the reason. In the joint project data, over

TABLE II-2:

REASON THE HOUSEHOLD LACKS SERVICE

	CALIFORNIA		FLORIDA		TEXAS		ARIZ	UTAH	MICH
	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	ALL RESP.	ALL RESP.	LOW INC.
REASON (Percent Responding:)									
EXPENSE	57	73	57	68	63	67	68	71	77
DO NOT WANT	21	14	21	20	15	14	21	4	10
MOVED	6	3	2	1	4	2	16	8	NA
LEVEL OF IMPORTANCE OF HAVING PHONE SERVICE									
VERY VALUABLE	41	44	32	33	52	54	40	56	NA
SOMEWHAT VALUABLE	14	11	29	31	26	20	40	NA	NA
LIKELIHOOD OF HAVING SERVICE WITHIN ONE YEAR									
VERY LIKELY	33	28	17	7	37	20	38	43	NA
SOMEWHAT LIKELY	16	17	23	24	21	11	20	NA	NA

SOURCES: See Table I-1.

two-thirds of the low income respondents without service say that expense is the reason. In the other data sets the percentage is even higher, ranging from 68 to 83 percent.

The majority say that having phone service would be important to them. Across the surveys, one-half to four-fifths say it would be very or somewhat valuable to have service. In spite of the value of service, the majority of these households do not expect to have service within the next year.1/

LARGE FRONT-END COSTS ARE THE PRIMARY OBSTACLE TO ACCESS TO THE NETWORK

We have already noted that the overwhelming majority of households without telephones say the reason is that they cannot afford it. The large front-end costs of obtaining access to the network appear to be the obstacle for most respondents. Respondents without telephones indicate that they are spending almost as much on making calls as it would cost them to have service on a monthly basis (see Chapter V).

Table II-3 shows that among those who identified specific charges, about two-thirds of the low income respondents in the joint project and respondents in Michigan and Virginia said that they could not afford installation charges. Similarly, one-half to four-fifths of these respondents said that they could not afford deposits. In contrast, much smaller percentages say that they

---

1/ Some observers have suggested that those without telephone service might be choosing to spend their money on other, less necessary commodities. A frequent example is subscription to cable television.

The joint project data show that a very small percentage of low income households without a phone -- less than 10 percent -- subscribe to cable TV. Low income households with telephones are four times as likely to subscribe to cable (approximately 44 percent). General survey respondents are even more likely to subscribe to cable (approximately 60 percent). Thus, the data does not support the contention that households without telephones are spending their money on other discretionary goods (symbolized by cable TV), rather than on telephones.

TABLE II-3:

ITEMS THAT ARE UNAFFORDABLE

(Respondents Stating that Charge is Required)

	CALIFORNIA		FLORIDA		TEXAS		MICH	VIRG
	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	LOW RESP.	ALL RESP.
PERCENT UNABLE TO AFFORD:								
INSTALLATION	54	68	46	67	45	50	63	56
DEPOSIT	71	85	52	68	53	52	64	69
MONTHLY CHARGE	29	42	20	35	17	21	27	57

SOURCES: See Table I-1.

cannot afford monthly charges. Among the low income population, 21 percent in Texas, 27 percent in Michigan, 35 percent in Florida and 42 percent in California said that they could not afford monthly charges, as did 57 percent in Virginia.

These responses are based only on those who stated that they expected to be required to pay a specific charge. About one-half of the respondents did not think that installation charges or deposits would be required (See Table II-4). This is clearly incorrect in the case of installation charges and is likely to be incorrect for many respondents in the case of deposits.

Virtually all respondents recognize that a monthly charge is required. However, about 35 percent are unsure of how much it would be or whether they could afford it.

We examined the affordability of service further by examining a firm statement of either "can" or "cannot afford" for each of the charges likely to be incurred (see Table II-5). In this analysis, if respondents said they did not know or were unsure of the amount, we did not consider that an obstacle to service.

Of the respondents who said that they could afford monthly charges, approximately 65 percent said there was one other charge they could not afford -- either installation charges, deposits or both. In contrast, of those respondents who said that they could afford installation costs, only 32 percent said there was at least one other charge they could not afford. Similarly, of the respondents who said that the deposit was affordable, only 16 percent said that at least one other charge was not affordable.

Thus, the primary barrier to access to the network is not monthly charges. Monthly charges are almost never the single barrier to access. For most households without service, front-end charges are the barrier.

Back bills are a mixed problem. Generally less than half and in some states as few as one-in-ten respondents said that they owe

TABLE II-4:

RESPONDENT AWARENESS OF CHARGES REQUIRED TO OBTAIN SERVICE

(Number of Respondents without telephone service)

TYPE OF CHARGE	NOT REQUIRED	UNSURE OF AMOUNT	NOT AFFORDABLE	AFFORDABLE
DEPOSIT	275	82	130	87
INSTALLATION	294	78	100	102
MONTHLY	3	200	82	289
BACK BILL	454	32	71	17

SOURCE: Joint Project Data Base

TABLE II-5:

INTERCONNECTIONS BETWEEN ITEMS THAT ARE DEEMED UNAFFORDABLE

	PERCENT NOT STATING THAT ANOTHER CHARGE IS UNAFFORDABLE	PERCENT STATING AT LEAST ONE OTHER CHARGE IS UNAFFORDABLE	TOTAL
MONTHLY CHARGES			
CAN AFFORD	35	65	100
CANNOT AFFORD	4	96	100
INSTALLATION CHARGES			
CAN AFFORD	69	32	100
CANNOT AFFORD	26	73	100
DEPOSIT			
CAN AFFORD	84	16	100
CANNOT AFFORD	38	62	100

SOURCES: Joint Project Data Base

back bills (see Table II-6). However, among those who owe back bills, the bills are quite large and virtually no respondent said that they could afford to pay them.

THOSE RESPONDENTS WHO CAN ESTIMATE THE COST OF INITIATING SERVICE GIVE GOOD ESTIMATES OF THE LIKELY COST AND STATE THAT THEY CAN AFFORD ABOUT HALF OF WHAT WOULD BE REQUIRED

In general, those respondents who provided estimates of required charges give the following average estimates -- deposits of $65 to $90; installation costs of $35 to $55; and monthly charges of $18 to $21 (see Table II-7). These appear to be reasonable estimates (see Chapter V). These respondents say that they can afford between a third and a half of what they expect to be required to pay.

TABLE II-6:

BACK BILLS AMONG HOUSEHOLDS WITHOUT TELEPHONE SERVICE

	CALIFORNIA		FLORIDA		TEXAS		MICH
	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	LOW INC.
PERCENT OWING	30	47	10	12	24	18	50
PERCENT UNABLE TO AFFORD	61	73	46	71	82	73	60
AVG. AMOUNT OWED (TOTAL $)	247	268	174	174	161	135	168
AVG. AMNT AFFDBLE (TOTAL $)	35	5	5	1	7	1	NA

SOURCES: See Table I-1.

TABLE II-7:

AMOUNTS EXPECTED TO BE REQUIRED TO OBTAIN SERVICE COMPARED TO AMOUNTS AFFORDABLE
(Respondents who state that charges are required)

	CALIFORNIA		FLORIDA		TEXAS		ARIZ	UTAH	MICH
	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	ALL RESP.	LOW INC.	ALL RESP.	ALL RESP.	LOW INC.
AMOUNT EXPECTED TO BE REQUIRED ($)									
DEPOSIT	74	65	90	84	77	80	87	NA	67
INSTALLATION	34	37	43	35	46	43	73	NA	54
MONTHLY	19	18	20	20	21	21	18	NA	NA
AMOUNT AFFORDABLE ($)									
DEPOSIT	24	20	38	34	31	23	35	45	NA
INSTALLATION	9	8	20	16	25	16	27	36	31
MONTHLY	6	5	8	7	11	8	15	20	25

SOURCES: See Table I-1.

III. UNIVERSAL SERVICE: UNDERSTANDING TELEPHONE USE

THE UNDERPINNING OF THE TELEPHONE AS A NECESSITY IS THE USE OF THE TELEPHONE TO CONDUCT THE NORMAL BUSINESS OF DAILY LIFE

The premise of public interest group telecommunications policy is that the telephone is a necessity. More importantly, it is not mere access to a phone, but easy use of the phone that is important. A telephone down the hall or across the street cannot substitute for a phone in the home. Cost concerns which limit local calling are equally constraining.

For nearly half a century the phone has been woven into the fabric of daily life, influencing decisions about where to live, where to locate services, how to acquire information, how to market services and conduct business and how to allocate time. The telephone also has taken on an important function as an emergency calling device to obtain assistance during a crisis.

Although "alarm box" uses of the phone -- medical and police emergencies -- are important, the telephone's fundamental value stems from its general use in conducting the business of daily life. Indeed, the value placed on the telephone appears to include an "option value." Consumers prefer to have unlimited flat rate service available and are willing to pay more for this option than they might have to pay, on average, for a type of service that bills them for every call. Not only do they want the phone, they want it there to be used frequently should the need arise.

This view of the importance of the telephone to daily life is clearly supported in the data by analysis of calling patterns and perceptions about the nature of telephone use.

OVERALL, HOUSEHOLDS REPORT MAKING ABOUT FIVE CALLS PER DAY, BUT LOW INCOME AND ELDERLY REPORT SOMEWHAT FEWER CALLS AND HOUSEHOLDS WITHOUT SERVICE REPORT MANY FEWER CALLS

Respondents with telephone service report a fairly large number of calls made, received and considered essential.

In the joint project data, local and long-distance calls were grouped together. In the overall national sample, respondents report an average of 36 calls per week, or approximately 144 per month (see Table III-1). The average number of calls among the general survey respondents in California, Florida and Texas ranged from 29 to 43 per week.

Low income and older respondents with telephones in the national sample and California and Florida report making about one-quarter fewer calls; this does not hold true in Texas. Households without telephones make many fewer calls, around 10 per week.

In Michigan, those interviewed over the telephone reported almost exactly the same level of usage (again combining local and long distance calls). Those interviewed face-to-face report higher levels of usage. Moreover, the Michigan survey was restricted to low income households. It indicates low income levels of usage somewhat higher than those of the low income respondents in the joint project survey.

A small percentage (6 to 8 percent) of the general population makes less than one call per day. A slightly higher percentage of the older respondents make less than one call per day. Among the low income population, about twice as large a percentage -- 15 percent -- make less than one call per day. Many more of the households without service make a small number of calls. Between one-fifth and two-fifths of the respondents without phones make less than one call per week. Between a half and three-quarters make less than one call per day.

ALL RESPONDENTS DEEM A RELATIVELY HIGH PROPORTION OF CALLS TO BE ESSENTIAL, WITH THE ELDERLY AND LOW INCOME RESPONDENTS CONSIDERING A HIGHER PROPORTION OF THEIR CALLS ESSENTIAL

For all groups, calls are most frequently made to and received from friends (see Table III-2). This is followed by calls to and from relatives and businesses.

For households with telephones, calls to friends account for

TABLE III-1:

THE NUMBER OF CALLS MADE BY VARIOUS POPULATION SEGMENTS

	NUMBER OF CALLS MADE PER WEEK			
	PERCENT OF RESPONDENTS MAKING:			AVERAGE NUMBER MADE
STATE/ GROUP	LESS THAN ONE	ONE TO SIX	SEVEN OR MORE	
NATIONAL SURVEY	1	8	91	36
CALIFORNIA				
GEN. POP.	1	7	92	43
LOW INCOME	1	14	85	25
ELDERLY	1	10	89	28
NO PHONES	19	34	47	12
FLORIDA				
ALL	0	6	94	30
LOW INCOME	1	17	82	23
ELDERLY	1	9	90	25
NO PHONES	41	32	27	10
TEXAS				
ALL	2	6	92	29
LOW INCOME	1	13	86	29
ELDERLY	0	7	93	34
NO PHONES	29	39	22	7
MICHIGAN				
LOW INCOME	0	5	95	30
NO PHONES	1	20	79	21
ARIZONA				
NO PHONES	14	39	45	NA
UTAH				
NO PHONES	14	54	29	NA

SOURCES: See Table II-1. Michigan data are for telephone interviews only for those with telephones

TABLE III-2:

NUMBER OF CALLS MADE AND DEEMED ESSENTIAL PER WEEK

	NATIONAL SAMPLE						CALIFORNIA, FLORIDA AND TEXAS			
	TOTAL POPULATION		ELDERLY (65+)		LOW INCOME (L.T. $10,000)		RANDOM SAMPLE		OFF THE NETWORK	
	TOT	ESSN.	TOT	ESSN.	TOT	ESSN.	TOT	ESSN.	TOT	ESSN.
CALLS MADE TO:										
FRIENDS	18	7	14	6	13	6	18	6	3	2
RELATIVES	9	5	8	5	9	5	8	5	2	2
BUSINESSES	6	6	4	4	4	4	7	4	2	2
TOTAL	36	22	27	17	27	18	36	29	9	7
CALLS RECEIVED FROM:										
FRIENDS	16	6	13	5	11	5	18	5	1	1
RELATIVES	7	4	6	4	6	4	6	4	1	1
BUSINESS	4	4	2	2	2	2	4	4	0	0
TOTAL	28	15	22	12	20	12	34	25	2	2

SOURCE: JOINT PROJECT DATA BASE

about half of all calls made. Both low income and older respondents make many fewer calls to friends and businesses. Among respondents with phones, less than half the calls made to friends are deemed essential. A much higher percentage of other types of calls are deemed essential. About 60 percent of calls to relatives and 75 percent or more of calls made to businesses and others are deemed essential.

Even though the general survey respondents make many more total calls than the older and low income households with phones, there is a small difference in the number of calls deemed essential. The respondents to the national survey deem about 22 calls per week essential (3 per day). Elderly and low income households in that sample deem 17 to 18 calls per week essential. Virtually none of the respondents say they make no essential calls and over four-fifths say they make one or more essential calls per day.

HOUSEHOLD COMPOSITION AND THE AGE OF THE HOUSEHOLD HEAD AFFECTS ON USAGE PATTERNS INDEPENDENT OF OTHER DEMOGRAPHIC FACTORS

Part of the difference between samples in the number of calls made and deemed essential might be explained by the size of households. Low income and older households are smaller. An analysis was conducted in which thirteen demographic characteristics are considered simultaneously (sex of respondent, income, education, household size, language spoken at home, hispanic origin, presence of a disabled person in the home, receipt of public assistance, proportion of household members under six years of age, proportion between 6 and 13, proportion over 65, age of the household head, and race of the respondent). We observe that age of the household head, household size and the number of young children affect usage patterns independently of other demographic factors.

For almost every category of call, the older the household head, the lower the number of calls and the higher the percentage

deemed essential. The larger the household, the higher the number of calls and the smaller the percentage deemed necessary. The larger the proportion of young children, the smaller the number of calls and the larger the percentage deemed essential.

HOUSEHOLDS WITH SERVICE ANTICIPATE PROBLEMS SHOULD THEY BE FORCED TO GIVE UP SERVICE

The high level of calling deemed necessary is consistent with the responses to questions about problems that would be encountered if the household did not have a phone.

The problem that general survey respondents most frequently said they would encounter if they lacked phone service would be an inability to get help in emergency situations (42 percent) -- general emergencies, medical emergencies and police emergencies (see Table III-3). The second most frequent problem projected was a general lack of communication and communications with friends and family (36 percent). Twelve percent said that the problem they expected would be general inconvenience. Business/work problems were next most frequently cited (11 percent). Only 4 percent said they expected no problems.

The older respondents anticipate a somewhat different pattern of potential problems. The older respondents exhibit more concern about general communication, general emergencies and medical emergencies, but less concern about business/work uses.

THE OVERWHELMING MAJORITY OF HOUSEHOLDS THAT DESIRE SERVICE BUT DO NOT HAVE IT EXPERIENCE PROBLEMS AS A RESULT OF THE LACK OF SERVICE

Approximately 54 percent of those who said they did not want a phone said they encountered no problems as a result of a lack of service (see Figure III-1). In contrast, only 20 percent of those who gave another reason for not having service said they encountered no problems.

Among those who said they don't want a phone only one-third

TABLE III-3:

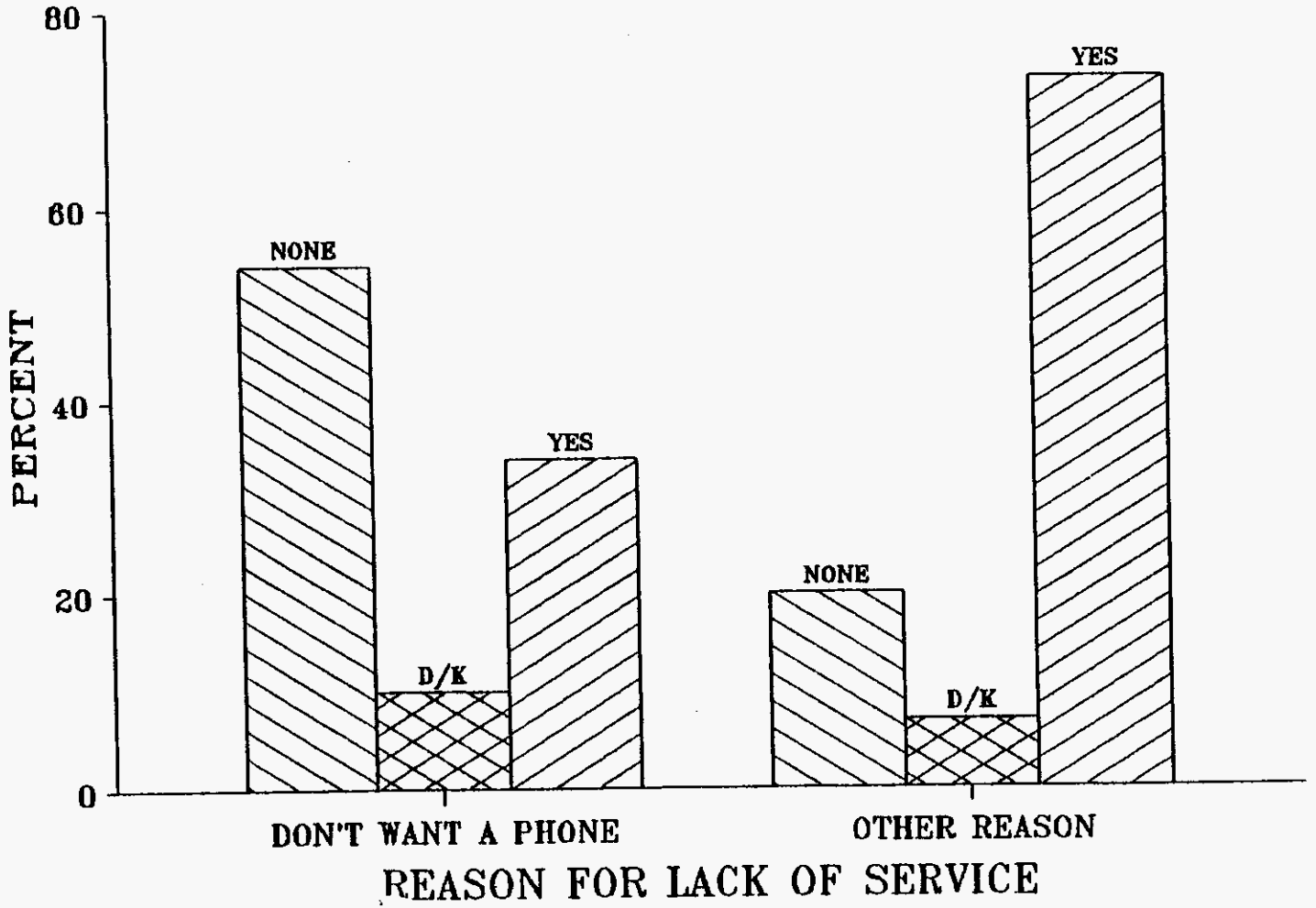
PROBLEMS PROJECTED TO RESULT FROM A LACK OF PHONE SERVICE BY RESPONDENTS TO THE NATIONAL SURVEY

	SAMPLE GROUPS (Percent of Total)		
	ALL RESPONDENTS	OVER 65	UNDER $10,000
TYPE OF PROBLEM			
LACK OF COMMUNICATIONS	36	42	27
GENERAL EMERGENCIES MEDICAL./POLICE EMERGENCIES	42	55	47
SAFETY	2	2	1
INCONVENIENCE	12	11	18
BUSINESS	11	1	4

SOURCES: Joint Project Data Base

FIGURE III-1

PERCENT REPORTING PROBLEMS DUE TO LACK OF SERVICE



said they encountered problems from lack of service. Among those who gave a different reason for not having service, almost three-quarters said they encountered a problem.

Respondents desiring service cited communications during emergencies as the problem they most frequently experienced (27 percent of problems cited; see Table III-4). The second most frequent problem was a lack of general communications (24 percent). Approximately 20 percent of the problems cited can be classified as inconvenience (ease of paying bills, not having to bother others to make calls or general inconvenience). Approximately 18 percent of the respondents cited safety problems. Finally, 9 percent of the respondents cited work related problems.

DIFFERENCES IN USAGE SUGGEST THAT LACK OF TELEPHONE SERVICE IMPOSES SERIOUS DEPRIVATION ON HOUSEHOLDS WITHOUT PHONES

The problems encountered by the households without service and the difference in levels of telecommunications usage indicate a serious deprivation suffered by those without telephones. In the joint project, households with service report making over three times the number of calls made by those without service. In Michigan they report about twice the number of calls made (see Figure III-2). The difference in calls received is much larger.

Combining calls made and received, the households with telephones in the joint project report 50 to 90 conversations per week. The national average was 64. The average in Michigan was 66. With an average of three people per household, each member of the household makes approximately 11 incoming and 11 outgoing calls per person per week -- or three phone conversations per person per day.

Households without telephone service hold less than half the number of phone conversations. In Michigan they report just under 30 conversations per week. In California, Florida and Texas they report only 14, 11 and 9 phone conversations per week, respectively.

TABLE III-4:

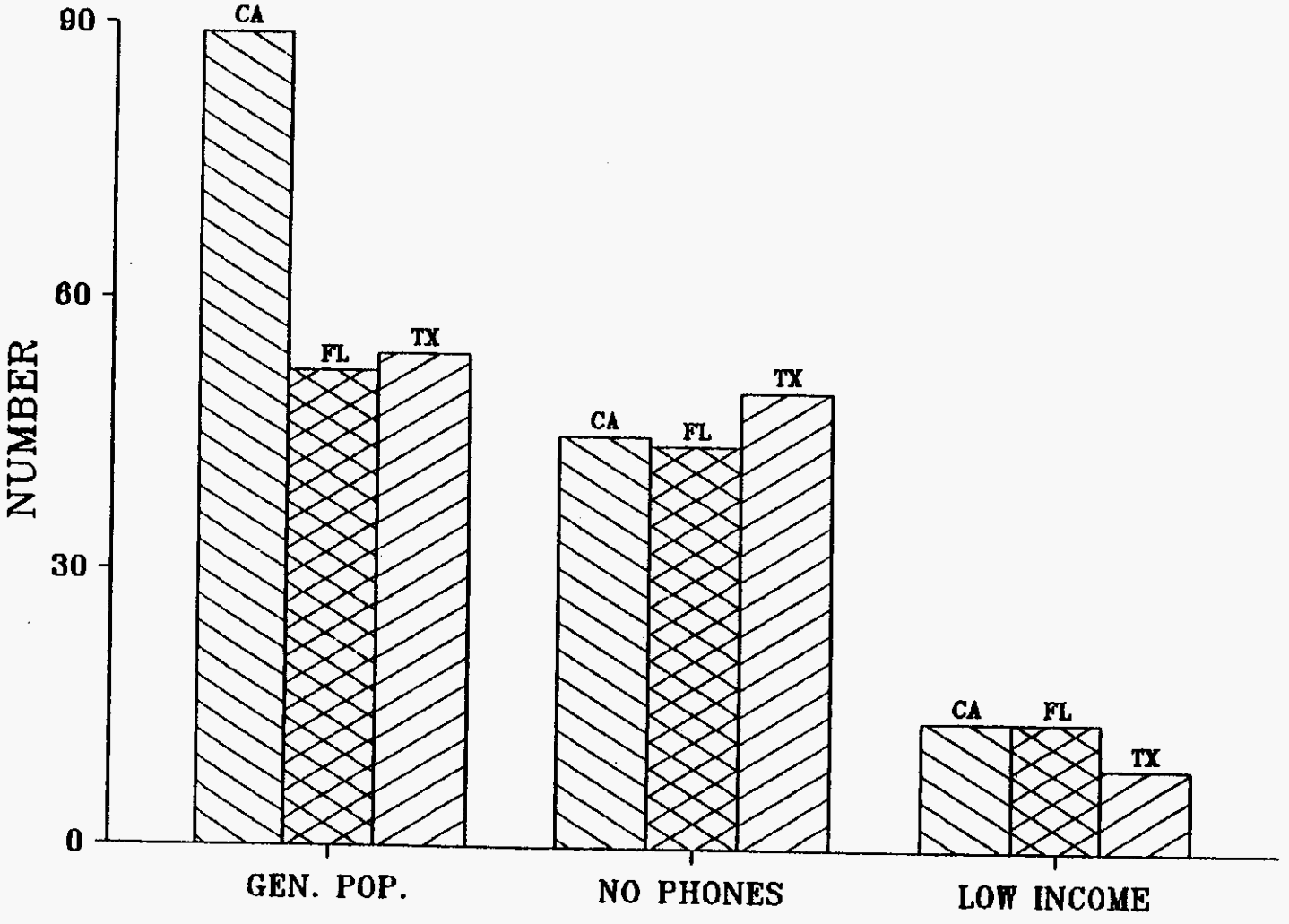
TYPES OF PROBLEMS RESULTING FROM LACK OF SERVICE

	PERCENT OF TOTAL MENTIONS
LACK OF COMMUNICATIONS	24
WITH RELATIVES	20
GENERAL	4
WORK RELATED	9
JOB CALL IN	5
OTHER	4
EMERGENCY	27
GENERAL	19
MEDICAL	8
HEALTH RELATED	7
CALL DOCTOR	4
SCHOOL CANNOT CALL IF CHILD IS ILL	3
INCONVENIENCE	20
GENERAL	9
PAYING BILLS	7
BOTHER OTHERS FOR PHONE	4
SAFETY	18
DISABLED	1

SOURCES: Joint Project Data Base

FIGURE III-2

WEEKLY TELEPHONE CONVERSATIONS



THE LEVELS OF USAGE DEEMED ESSENTIAL SUGGEST THE UNDERPINNINGS OF CONSUMER RESISTANCE TO LOCAL MEASURED SERVICE

Households use their telephones frequently. The general survey population reports about five calls per day of which three are deemed essential. On a monthly basis they make 144 total calls and 88 essential calls. This includes local and long distance calls. Households make about 120 local calls per month.

These data may shed light on the social underpinnings of consumer resistance to local measured service. Most plans for measured service offer much lower levels of calls which are not billed separately. Frequently, proposals for measured service have meant that consumers would have higher bills at the average level of usage of the survey population.

In addition, although households emphasize emergency use of the telephone as a problem that they encounter (or would encounter) as a result of a lack of service, they do not make many emergency calls. Emergency calls make up only a very small portion of the total number of calls made and deemed essential.

On the other hand, simple convenience is not a prime problem encountered in not having a phone. General communications are the driving force behind the perception of a telephone as essential.

IV. INFORMATION, PRODUCTS AND PRICES IN THE NEW TELECOMMUNICATIONS INDUSTRY

CONCERNS PERSIST ABOUT THE ABILITY OF CONSUMERS TO EXERCISE EFFECTIVE CHOICES, ABOUT THE DISTRIBUTION OF COSTS AND BENEFITS AND ABOUT THE PRESSURES THAT HAVE BEEN PLACED ON THE PRICE OF BASIC SERVICE IN THE EMERGING TELECOMMUNICATIONS INDUSTRY

Many of the pricing and policy changes in the telecommunications industry have been justified on the grounds that they provide consumers with a wider range of options and products. While public interest groups have been supportive of such potential benefits, they have been concerned about the difficulties that the new telecommunications environment imposes on consumers and a potential disjuncture between those who bear the costs and those who reap the benefits.

The simultaneous provision by one firm of necessity services and discretionary services, of partially competitive services and fully monopolized services creates difficult regulatory problems. The premise of public interest group policy is that the primary goal of the telecommunications network must be the provision of basic telephone service.

The data indicate that the continuing concerns about the ability of consumers to benefit from the new environment and the costs imposed by that environment are well founded.

ALTHOUGH CONSUMERS ARE GENERALLY AWARE OF THE CHANGES IN THE TELECOMMUNICATIONS INDUSTRY, THERE ARE CRITICAL AREAS WHERE INFORMATION ABOUT THE LONG DISTANCE MARKET IS LAGGING

Over 90 percent of the respondents know they are being asked to choose a long distance carrier. Among those who said they had been asked, 89 percent said they had made a choice. Moreover, of the 11 percent who said they did not make a choice, 4 percent said they had considered using another company. Thus, 93 percent of those who said they had been asked to choose a carrier appear to have made a conscious choice.

Those with higher incomes and more education are more likely to know that they are being asked to choose a long distance carrier and more likely to say that they considered changing carriers. Older respondents are less likely to say they considered changing carriers.

However, approximately one-sixth of the respondents said that the local company was their long distance carrier or that they did not know who their carrier was (see Table IV-1). Households headed by those over 65 and low income households were more likely to give these responses. Almost a fifth of low income households and a quarter of older respondents said that they did not know who their long distance carrier was or named their local company. Thus, a fairly large group of consumers is not fully cognizant of the process of choosing a long distance carrier.

KNOWLEDGE ABOUT LOCAL SERVICE IS ALSO LAGGING IN A NUMBER OF AREAS

The vast majority of consumers stated that they subscribe to flat rate service (79 percent) -- which has an unlimited number of unbilled calls -- while only 7 percent say they do not know. Those over 65 were somewhat less likely to subscribe to a service with an unlimited number of unbilled local calls (74 percent).

However, respondents generally do not know what their service is called. Moreover, only half of the respondents state that they are aware that local companies offer more than one local service calling option. Among those who say they subscribe to measured service, 72 percent say they are aware of other calling plans (see Table IV-2). Only 46 percent of those who say they do not subscribe to measured service are aware of alternatives.

Older respondents are generally less aware of alternative calling plans. Those under 35 years of age are more than twice as likely to say that they are aware of alternative calling plans than those over 65.

TABLE IV-1:

PERCENTAGE OF RESPONDENTS WHO DO NOT KNOW OR INCORRECTLY IDENTIFY THEIR LONG DISTANCE CARRIER

CATEGORY OF RESPONDENT	LOCAL TELCO NAMED	DON'T KNOW	TOTAL INCORRECT
AGE			
LT 50	9.7	3.7	13.4
50 TO 65	11.7	4.4	16.1
GT 65	12.6	12.1	24.7
INCOME			
LT $10,000	10.8	8.0	18.8
GT $10,000	11.2	5.0	16.6

SOURCE: JOINT PROJECT DATA BASE

TABLE IV-2:

RESPONDENT KNOWLEDGE OF LOCAL CALLING PLAN OPTIONS

	AGE OF RESPONDENT							
	35 OR LESS		36 TO 49		50 TO 65		OVER 65	
	KNOWLEDGE OF CALLING PLANS		KNOWLEDGE OF CALLING PLANS		KNOWLEDGE OF CALLING PLANS		KNOWLEDGE OF CALLING PLANS	
	YES	NO/DK	YES	NO/DK	YES	NO/DK	YES	NO/DK
TYPE OF SERVICE								
MEASURED (LIMIT ON CALLS)	86	14	68	32	65	35	53	47
FLAT RATE (NO LIMIT ON CALLS)	55	45	49	51	46	54	27	73

SOURCE: JOINT PROJECT DATA BASE

PRICING AND PRODUCT INFORMATION ARE A CRITICAL AREA IN WHICH CONSUMERS EXPRESS DIFFICULTY IN OBTAINING INFORMATION

Generally, consumers do not find it difficult to gather information about most aspects of telephone service (see Table IV-3). On a scale of 1 to 5, where 1 is "very easy" and 5 is "very difficult," less than a fifth of all respondents find it difficult (giving a score of 4 or 5) to understand their telephone bills, to know where to find out about local or long distance service in general, to know who to call for local or long distance service problems, and to know where to go for equipment information or repair.

On the other hand, a quarter to a third of the respondents said that they had difficulty understanding calling plans for local and long distance service, and knowing when prices change for local and long distance service. Allowing for all demographic factors, older respondents express greater difficulty in these areas.

Pricing and product information are crucial to enlightened consumer choices in a competitive market and this appears to be an area that needs improvement.

LOW INCOME AND ELDERLY HOUSEHOLDS ARE NOT WELL SITUATED TO REAP THE BENEFITS OF THE "INFORMATION AGE"

The promise of the "information age" is frequently discussed in terms of new products and services delivered over the telephone network. Low income and older households are not well situated to reap these benefits.

For example, one of the frequently mentioned benefits of the evolving telecommunications industry is the ability to use computers to access the growing number of publicly available data bases and information services. It should not be surprising to find, however, that low income and older households do not have computers (see Table IV-4). Approximately 28 percent of respondents under 50 years of age have home computers.

TABLE IV-3:

PERCENTAGE OF HOUSEHOLDS EXPRESSING DIFFICULTY IN OBTAINING KNOWLEDGE ABOUT TELECOMMUNICATIONS

(Percent of Respondents answering "4" or "5" on a scale of 1 to 5; where 1" = very easy and "5" = very difficult)

	LOCAL SERVICE	LONG DISTANCE
GENERAL KNOWLEDGE	14	20
CALLING PLANS	27	32
SERVICE PROBLEMS	12	19
PRICE CHANGES	25	31

	GENERAL INDUSTRY
EQUIPMNT AVAILABILITY	20
EQUIPMENT REPAIR	16
TELEPHONE BILLS	19

SOURCE: JOINT PROJECT DATA BASE

TABLE IV-4:

OWNERSHIP OF COMPUTERS, SUBSCRIPTION TO CABLE TV AND "NON-BASIC" USAGE OF THE NETWORK

(Percent of Respondents)

	OWN A COMPUTER	SUBSCRIBE TO CABLE TV	CONSULT A HEALTHCARE INFO LINE	PERCENT VERY OR SOMEWHAT INTERESTED IN TAKING A COURSE AT HOME	PERCENT WHO TOOK A COURSE IN THE PAST YEAR
AGE					
LT 50	28	52	23	60	67
50 to 65	16	55	15	41	52
GT 65	3	43	12	26	33
INCOME					
LT $10,000	6	36	18	41	43
$10-14,999	14	47	18	51	39
$15-19,999	9	54	20	58	52
$20-24,999	13	53	21	47	60
$25-29,999	18	47	25	53	68
$30-34,999	30	63	21	49	67
$35-49,999	34	57	18	63	66
$50,000 OR MORE	44	53	20	48	80

SOURCE: JOINT PROJECT DATA BASE

Approximately 16 percent of respondents between the age of 50 and 65 have computers. Only 3 percent of respondents above 65 have computers.

Approximately 6 percent of respondents with incomes below $10,000 have home computers. In contrast, about 25 percent of respondents with income above $10,000 have home computers. Forty-four percent of respondents with incomes over $50,000 have computers.

As mentioned earlier, lower income and older respondents are also less likely to subscribe to cable TV.

Lower income and older respondents are less likely to have used the telephone for certain informational purposes. The joint project asked about health care and education. The low income and older populations were less likely to have used a health care information hotline and expressed less interest in home-based .pa education.

To be sure, neither the distribution of computers nor attitudinal predispositions to acquire information can be attributed to telecommunications policy or the new telecommunications environment. However, these basic facts should be taken into account when claims are made about the future benefits in the industry, particularly where a tension exists between the "information age" and the "telephone age." Those least likely to benefit from the information age are also most likely to suffer should the costs of maintaining telephone service -- achieving or preserving participation in the "telephone age" -- rise.

The basis for this concern becomes apparent in light of recent changes in the cost of basic service, which are discussed in the next chapter.

V. RECENT CHANGES IN TELEPHONE RATES AND BILLS

CONCERNS ABOUT RATE INCREASES

The level and rate of increase of telephone bills in the post-divestiture era have been among the most hotly debated of all telecommunications issues.1/ The concern of public interest groups has been not only with the impact that rising rates may have on access to the network or low income budgets, but also with the impact on consumers in general.

THE MAJORITY OF HOUSEHOLDS SPEND MORE FOR SUBSCRIBER LINE CHARGES THAN THEY SAVE ON THE ASSOCIATED REDUCTIONS IN LONG DISTANCE RATES

One debate has centered on interlata long distance bills -- bills for placing calls which are handled by long distance companies like AT&T, MCI and GTE Sprint. Federal subscriber line charges shifted costs from long distance usage charges to fixed monthly charges. These charges fall on all households, whether or not they place long distance calls. Those who make few long distance calls end up with a higher bill -- they pay more in the form of the line charge than they save as a result of reductions in usage charges. Those who make many calls end up with lower bills. The debate has centered on how many households end up paying more overall. The median and the overall distribution have become important points in the debate.

A national average bill for long distance calling was approximately $12.00 per month during the period of the joint project (see Table V-1). The data show that a significant percentage of all households do not place any long distance calls.

1/ The Federal Communications Commission has estimated rates of change in local and long distance bills and rates (Industry Analysis Division, Trends in Telephone Service, July 22, 1986 and Primer and Sourcebook on Telephone Price Indices and Rate Levels; Summary of State Rate Cases, October 21, 1986. The Bureau of Labor Statistics estimates rates of inflation in telephone bills in the process of compiling the consumer price index.

TABLE V-1:

MONTHLY LONG DISTANCE BILLS: DESCRIPTIVE STATISTICS

	PERCENT OF SUBSCRIBERS MAKING NO CALLS (4 to 6 months)	MEDIAN BILL	AVERAGE BILL
ATT NATIONAL	**10 - 20**	**$6**	**$13**
MICHIGAN	**10**	**$6**	**$12**

SOURCES:

ATT National - Letter from D. J. Culkin, AT&T to Albert Halprin, February 3, 1987.

Michigan, see Table I-1.

Between 10 and 20 percent of all households place no long distance calls in a given four to six month period and 5 to 10 percent make no calls in a year. The data also show that in the middle of 1986, more than half of all households had monthly long distance costs of less than $6. Over two-thirds of households pay more in subscriber line charges than they saved as a result of the reduction in the rates for usage.

LOCAL PHONE BILLS AVERAGE $20 PER MONTH

An estimate of local bills for the time frame of the joint project can be arrived at as follows (see Table V-2). The Federal Communications Commission estimated that in late 1986 local basic flat rate service was $12.45 per month. Adding the subscriber line charge and taxes brings this to $15.99. A parallel estimate for flat rate service in Michigan starts from an actual monthly charge of $12.20. Adding the subscriber line charge and the FCC estimate of $1.28 per month in taxes brings the Michigan total to $15.48 -- almost the same as the FCC national average estimate.

Most households must now choose to perform inside wiring repairs or to purchase inside wiring maintenance from the local company, which the FCC estimates at a national average cost of $.66 per month. For illustrative purposes, we have assumed that 80 percent of subscribers take inside wire insurance. This would add an average of $.53 to the local bill.

In addition, there are charges for the rental of telephone sets. The joint project survey indicated an average of six rented sets for every ten household. The FCC estimates a rental cost of $2.25 per month (plus $.23 in taxes). This would add an average of $1.48 to the monthly bill.

The local bill also includes charges for enhanced services -- touch-tone, call forwarding, etc. In Michigan, the average bill for enhanced services incurred by flat rate subscribers was approximately $1.32 per month. The local bill may also include

TABLE V-2:

ESTIMATES OF LOCAL AND TOTAL BILLS: FLAT RATE SERVICE

SERVICE CATEGORY	FLAT RATE SERVICE			MEASURED SERVICE
	MICHIGAN		NATIONAL	MICHIGAN
LOCAL SERVICES				
MONTHLY ACCESS				
MONTHLY CHARGE	12.20		12.45	10.59
SUBSCRIBER LINE	2.00		2.00	2.00
TAX	1.28		1.28	1.28
SUBTOTAL MONTHLY ACCESS	15.48		15.99	14.13
OTHER LOCAL SERVICES				
ENHANCEMENTS (ACTUAL MICHIGAN)	1.32	=>	1.32	.89
WIRE (@ 80% PENETRATION WITH FCC ESTIMATE OF $.66)	.53		.53	.53
SET CHARGES (@ .6 SETS PER HH WITH FCC ESTIMATE OF $2.25)	1.48		1.48	1.48
SUBTOTAL OTHER LOCAL SERVICES	3.33		3.33	2.90
LOCAL USAGE (ACTUAL MICHIGAN NEAR ZONE CHARGES)	1.78	=>	1.78	2.91
SUBTOTAL LOCAL SERVICES	20.85		21.10	19.91
TOLL CHARGES				
INTRALATA (ACTUAL MICHIGAN)	8.90	=>	8.90	5.62
INTERLATAT (ACTUAL MICHIGAN; ATT NATIONAL AVG)	11.93		10.85	15.63
SUBTOTAL TOLL CHARGES	20.83		19.75	21.25
GRAND TOTAL MONTHLY BILL	41.68		40.53	41.17

SOURCES: See Text.

some usage charges for calls that are not defined as long distance calls, but are not within the unbilled calling zone. In Michigan the actual average for flat rate subscribers was $1.78. These estimates result in an average bill for flat rate subscribers of about $21. In Michigan, intralata toll charges were $8.90 for flat rate subscribers while interlata toll charges were $12. This brings the bill to a total of approximately $41.

Measured service subscribers in Michigan had local bills of about one dollar less, about $20. While their intralata toll bills were lower, their interlata toll bills were higher. Overall, their bills were about the same.

Against this background, we observe that respondents appear to estimate correctly their local bills, but overestimate their long distance bills somewhat. Respondents in the joint project and Michigan surveys were asked to report their bills (see Table V-3). The Michigan survey then verified these self reports with actual bills from phone company records. The self report of local bills appears to be accurate. This probably reflects the fact that local bills do not vary much from month to month. The monthly charge is a familiar number.

Self-report of long distance bills appears to be less reliable. Respondents appear to overestimate these bills. Part of the difficulty may lie in the fact that respondents may not distinguish between intralata and interlata bills. Even with intralata bills running in the range of $9, there appears to be serious overestimation of interlata long distance bills.

LOCAL BILLS HAVE INCREASED DRAMATICALLY SINCE DIVESTITURE AND COMBINING LOCAL RATE INCREASES, SUBSCRIBER LINE CHARGES AND LONG DISTANCE USAGE RATE REDUCTIONS, THE AVERAGE RESIDENTIAL BILL INCREASED ABOUT TWICE AS FAST AS THE GENERAL RATE OF INFLATION

Compared to the period just before divestiture, local bills are up sharply. The FCC estimated that pre-divestiture monthly charges averaged $11.51. Since divestiture, local monthly charges

TABLE V-3:

COMPARISON OF SELF-REPORTED AND ACTUAL BILLS

	LOCAL	INTRA TOLL	INTER TOLL	TOTAL TOLL	TOTAL BILL
MICHIGAN					
SELF-REPORTED	23	N/A	N/A	22	45
ACTUAL	21	N/A	8	N/A	33
SYSTEM AVG.	19	9	12	21	40
HOUSEHOLDS WITHOUT PHONES	N/A	N/A	N/A	N/A	28
JOINT PROJECT					
SELF-REPORTED	19	N/A	N/A	26	50
NATIONAL AVERAGE	21	N/A	11	N/A	40

have increased to $13.73, which combined with the subscriber line charge brings the total to $15.99. This is almost a 39 percent increase.

Other charges also are incurred now by local customers. First, inside wire charges are likely incurred by most subscribers. The cost of telephone rental has increased approximately $.75 since divestiture. Low income and elderly households are more likely to incur these costs than others. Enhanced service and usage charges may have increased somewhat less rapidly. Low income and elderly are less likely to incur these expenses.

Overall, the Bureau of Labor Statistics data indicate increases in prices for local service (including installation charges as they occur in the sampled bills) of approximately 36 percent (see Figure V-1). These are substantial increases.

Combining the reduction in long distance rates and the increase in subscriber line and inside wire charges (based on Bureau of Labor Statistics numbers), the overall increase in the average bill has been about 18 percent. This is approximately twice the rate of general inflation.

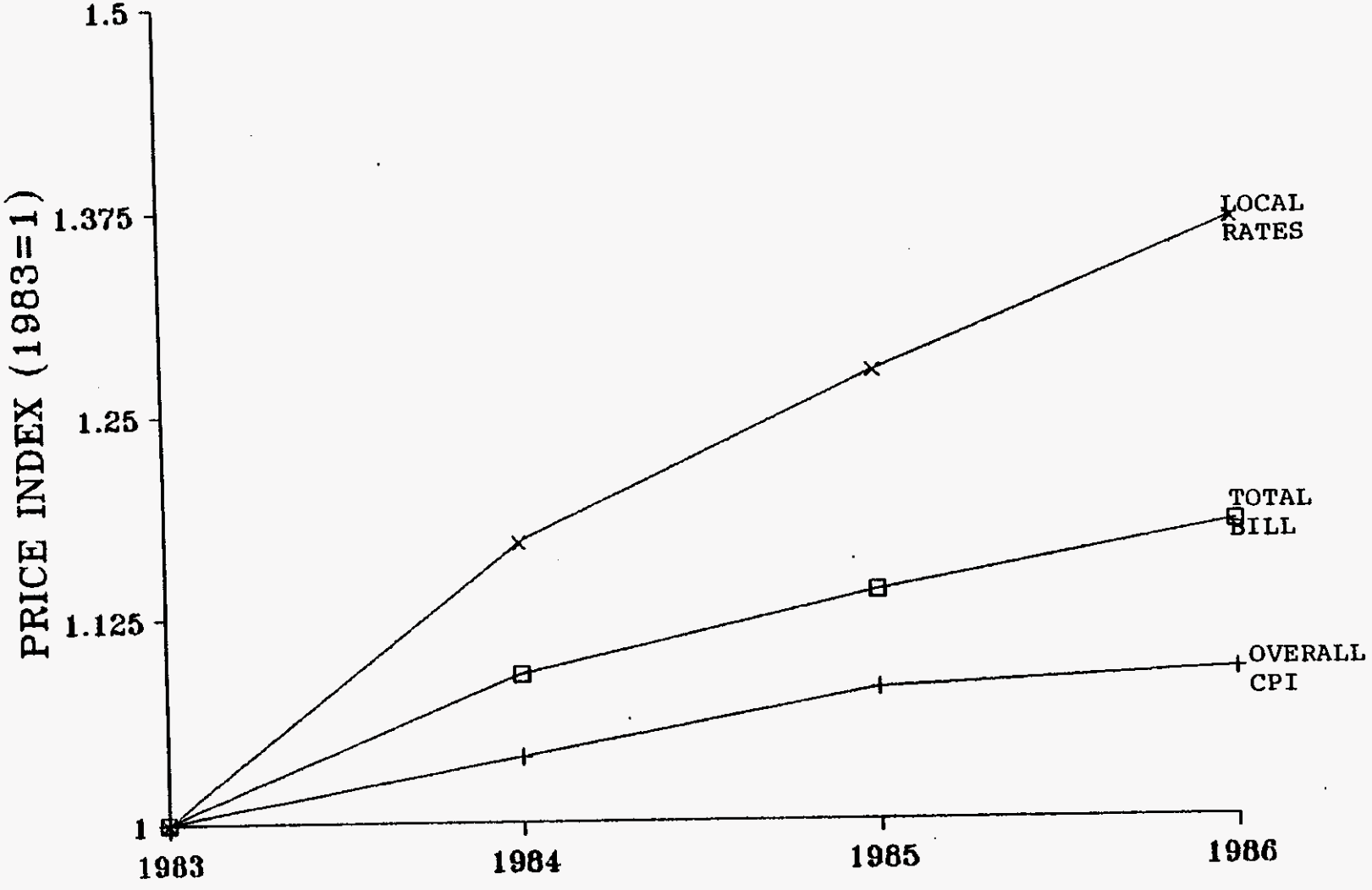
TELEPHONE EXPENDITURES IMPOSE A SIGNIFICANT BURDEN ON LOW INCOME HOUSEHOLDS

We can estimate the burden that the cost of telephone service places on household budgets. There is no simple, objective measure of burden. However, a standard approach to gauging the burden that the consumption of necessities places on the budgets of low income households has been to calculate the percentage of income spent for the necessity.

For the purposes of this analysis, we can rely on the expenditures of those households which make up the bottom fifth of the income distribution. The Michigan and joint project surveys defined a low income household as one with an annual income below $10,000 per year. According to the Current Population Survey,

FIGURE V-1:

INDEX OF PRICES: OVERALL CPI, LOCAL AND ALL TELEPHONE



almost exactly one-fifth of all households had incomes below this figure. Moreover, the percentage of households without telephones in this group was approximately 20 percent. For households in the next fifth of the income distribution (incomes between $10,000 and $17,500) the penetration rate is 91 percent. It varies between 96 and 99 percent for households with higher incomes. Thus, the annual income criteria of $10,000 corresponds to the poorest fifth of the population and it identifies a group that is distinctly different from the remainder of the population.

Figure V-2 presents estimates of the percentage of income spent on telephone service by households in each fifth of the income distribution in 1981 through 1984. These figures are not adjusted for penetration rate differences. That is, they are derived by dividing total expenditures for telephones by the number of households. Since a much larger percentage of households do not possess telephones in the lower income segment, this significantly understates the burden on households with phones.

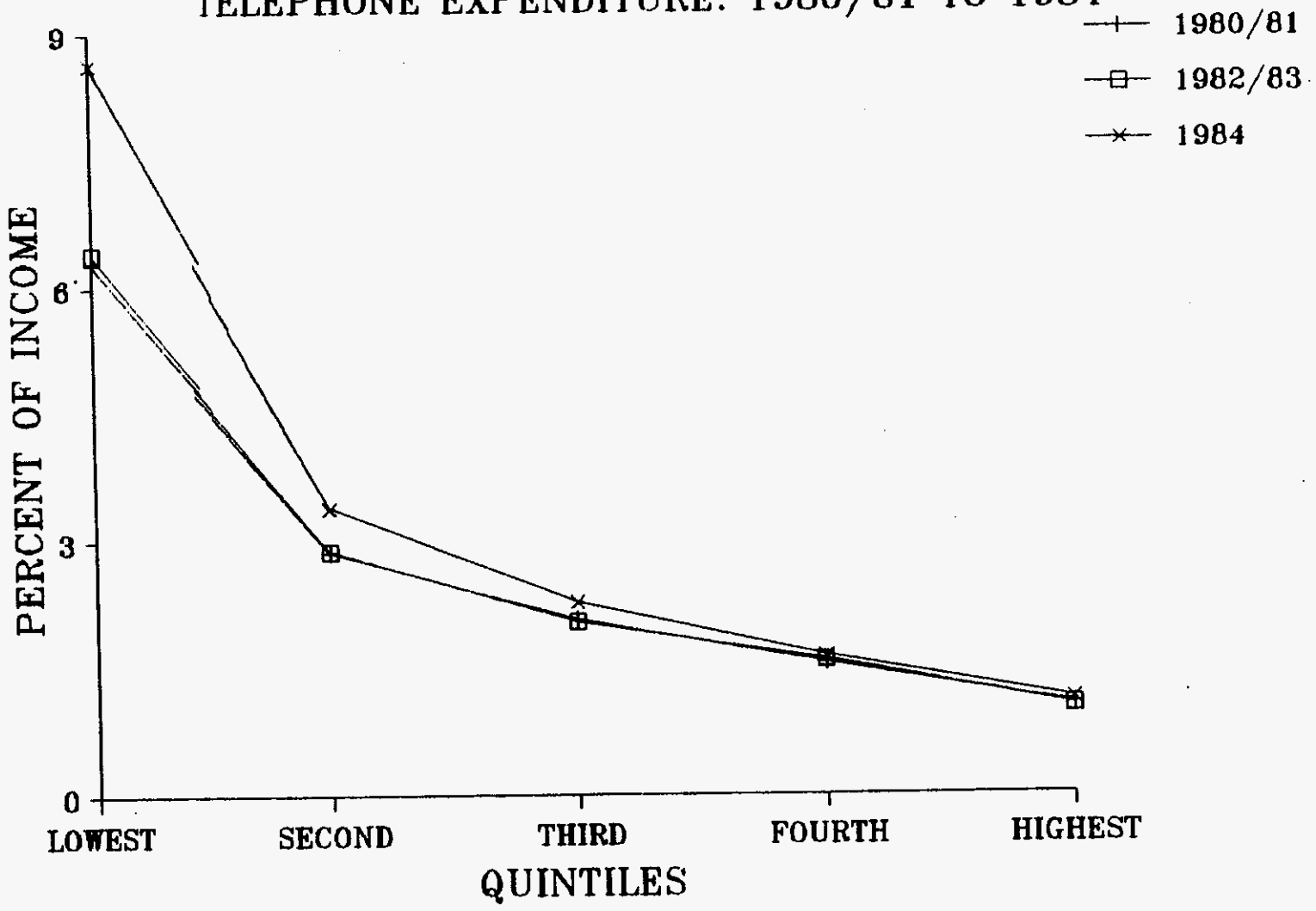
The figure makes it clear that lower income households devote a much larger share of their income to telephones and that the percentage has increased over the years. For the poorest fifth of the population, telephones accounted for just over 6 percent of income in 1980/81 and 1982/83. Telephone expenditures accounted for 3 percent of the income of the second quintile of the income distribution and only 2 percent for the wealthiest fifth of the population.

In 1984, telephone expenditures as a percentage of income increased sharply for the lowest income group -- to almost 9 percent. It increased much less dramatically for the other income groups. The large increase in expenditures as a percentage of income reflects the record breaking local rate increases awarded the first year after divestiture.

Figures for 1985 and 1986 from the consumer expenditure survey are not yet available. However, the data reviewed above on the

FIGURE V-2:

TELEPHONE EXPENDITURE: 1980/81 TO 1984



large increases in telephone rates, which are much larger than increases in income, suggest that the burden has continued to grow.

Since low income households typically spend more than they earn -- going into debt or using savings -- the expenditure on telephones represents a smaller percentage of total expenditures than it does of total income. Nevertheless, lower income households use a much higher portion of their expenditures for telephones. Moreover, for the purposes of public policy -- e.g., participation in public assistance programs -- income is the relevant characteristic. A program targeted at those households with incomes below $10,000 would certainly assist those for whom telephone expenditures represent a disproportionate share of household resources.

VI. CONCLUSION

PUBLIC INTEREST TELECOMMUNICATIONS POLICY

Dramatic changes in the telephone industry have created an urgent need for detailed research into the fundamental nature of the telephone and for careful examination of public policies toward telecommunications. In this report the American Association of Retired Persons and the Consumer Federation of America have reviewed the implications of a large body of recent data for public interest group telecommunications policy.

We find strong support for the basic tenets of that policy. Because the phone is a necessity, two distinct segments of the population are at risk -- those without service and low income households with service for whom the expense may be an excessive burden. We also observe the factors that generate general consumer concerns about price and policy changes in the new telecommunications industry.

> The costs of access to the network are a major barrier to a large segment of the low income population.
>
> The costs of maintaining telephone service may place a serious strain on the budgets of another segment of the low income and elderly population.
>
> Households without service suffer a serious deprivation of telecommunications usage and experience problems as a result of that deprivation.
>
> Approximately three calls per day are deemed essential -- a level of usage that exceeds the number of unbilled calls per day typically included in local measured service options.
>
> There is a continuing need for better information about prices and products. Recent price changes for both long distance and local service have left consumers with considerably higher telephone bills.

AFFORDABILITY: HOUSEHOLDS WITHOUT PHONE SERVICE, WHO AND WHY

The group identified as not having telephones is quite different from the group defined as low income. Heads of households without service tend to be much younger than the general population. In contrast, the low income population with service tends to be older than the general population. Those without phones tend to have lower incomes, be less educated and be more likely to receive public assistance than the general population or low income respondents with telephones.

The data also make clear that lack of phone service is emphatically a low income problem. Between two-thirds and four-fifths of all households without service had incomes below $15,000.

The overwhelming majority of households without service say they want it, but cannot afford it. Between two-thirds and four-fifths of the low income respondents without service say that expense is the reason. The large front-end costs of obtaining access to the network appear to be much more of a problem than the recurring monthly charges.

UNDERSTANDING TELEPHONE USE

Respondents with telephone service report a fairly large number of calls made, received and considered essential. Combining local and long distance calls, respondents report making an average of 36 calls per week, approximately 144 per month. Low income and older respondents with telephones report making somewhat fewer calls. Households without telephones make a much lower number of calls, around 10 per week.

The respondents to the national survey deem about 22 calls per week essential (3 per day). Elderly and low income households in that sample deem 17 to 18 calls per week essential. Virtually none of the respondents say they make no essential calls and over four-fifths say they make one or more essential calls per day.

These data may shed light on the social underpinnings of consumer resistance to local measured service. Most plans for measured service offer much lower levels of calls which are not billed separately. Frequently, proposals for measured service have meant that consumers would have higher bills at these levels of usage.

Among those who said they don't want a phone, only one-third said they encountered problems from a lack of service. Among those who gave a different reason for not having service, almost three-quarters encountered a problem. The most frequent problem cited by respondents without service who want it was communication during emergencies and lack of general communications.

INFORMATION IN THE NEW TELECOMMUNICATIONS INDUSTRY

Although about 93 percent of those who said they had been asked to choose a carrier appear to have exercised a conscious decision as part of the process, approximately one-sixth of the respondents said that the local company was their long distance carrier or that they did not know who their carrier was. Almost a fifth of low income households and a quarter of older respondents said that they did not know who their long distance carrier was or named their local company. Thus, a fairly large group of consumers is not fully cognizant of the process of choosing a long distance carrier.

Generally, consumers do not find it difficult to gather information about most aspects of telephone service, but they do experience difficulty in several key areas. A quarter to a third of the respondents said they had difficulty understanding calling plans and knowing when prices change for local and long distance service.

Low income and older respondents are not well situated to reap the benefits of the "information age." Low income and older respondents are less likely to have computers and less likely to have

used the telephone for certain informational purposes. These basic facts should be taken into account when claims are made about future benefits from the industry, particularly where a tension exists between the "information age" and the "telephone age."

RECENT PRICE CHANGES IN THE TELECOMMUNICATIONS INDUSTRY

The data indicate an average monthly interlata bill of about $11. However, between 5 and 10 percent of all households place no long distance calls in a given year and half of all households had bills of less than $6 per month. Over two-thirds of the households pay more in subscriber line charges than they save as a result of reduction in the usage rates.

Compared to the period just before divestiture, local bills are up sharply. Overall, the Bureau of Labor Statistics shows over a 36 percent increase in local bills and an 18 percent increase in overall bills in the three years after divestiture.

For the poorest fifth of the population, telephone bills accounted for just over 6 percent of income in 1980/81 and 1982/83. Telephone expenditures accounted for 3 percent of the income of the second quintile of the income distribution and only 2 percent for the wealthiest fifth of the population. In 1984 telephone expenditures as a percentage of income increased sharply for the lowest income group -- to almost 9 percent. It increased much less dramatically for the other income groups.

Thus, the central concerns regarding universally affordable basic telephone services expressed in public interest group policies are consistent with the data reviewed.

APPENDIX A

GLOSSARY

CARRIER -- The telephone company which provides service to a given customer.

CURRENT POPULATION SURVEY -- A survey conducted by the Bureau of the Census in March and October of each year. Since 1983 questions about the availability of telephone service have been included.

DEPOSIT -- An amount of money required to be paid to a local telephone company before it will initiate service. Deposits are generally not required of consumers who have an unblemished, and recent, credit history with any local phone company. Thus, they affect mostly new consumers and those who have been unable to afford telephone service.

DIVESTITURE -- The process of dividing the national telephone monopoly into separate companies, as overseen by the Federal Court. Divestiture created a smaller American Telephone & Telegraph -- providing long distance service in competition with other carriers; and 22 Bell Operating Companies -- operating as monopolies to provide local telephone service -- which are owned by 7 regional holding companies.

ECONOMETRIC -- The application of statistical and mathematical techniques to problem solving.

ELASTICITY -- A measure of the change in demand for a commodity in response to a change in price (of that commodity or some other commodity) or to a change in income.

ELDERLY/OLDER AMERICANS -- Defined as those Americans over 65 years of age.

INSTALLATION -- The process of connecting a consumer to the local telephone network. Sometimes this requires actual installation of wires, often it does not.

INTERLATA -- Telephone calls made from one local access and transport area (LATA) to another LATA. The LATA is the area within which the local telephone company provides service. Long distance carriers provide service for calls between LATAs.

INTRALATA -- Telephone calls made within the LATA. Although these are local calls, not handled by a long distance carrier, some calls may be billed in manner similar to long distance calls -- e.g. charges may vary by time of day, distance and duration of the call.

LOCAL MEASURED SERVICE -- A type of local telephone service whereby a consumer is allowed a given number of local calls per month. The consumer is billed for each call made above the limit.

LONG DISTANCE CARRIER -- The company which provides long distance calling service to a consumer.

LOW INCOME -- Defined as households with annual income reported to be less than $10,000 per year.

MEAN -- The number which divides a distribution in half -- half of the numbers in the distribution are greater than the mean and half are less.

MONTHLY RECURRING CHARGES/BASIC MONTHLY ACCESS CHARGE -- The costs incurred by a consumer simply to have a phone in the home. Depending on the type of service, this may include some number or an unlimited number of local calls.

NETWORK -- A fabric of wires interconnected that cross at regular intervals. The telephone system exhibits the characteristics of a network with each subscriber able to establish communications with virtually every other subscriber.

PENETRATION RATE -- The percentage of households that have telephones in the home.

QUINTILES -- The division of a distribution of numbers into five equal parts.

SET RENTAL -- The monthly cost of using a telephone in the home which belongs to the local telephone company.

SUBSCRIBER LINE CHARGES -- A monthly fixed charge, imposed by the Federal Communications Commission, to recover the costs of the telephone network which are allocated to long distance service. As these fixed monthly charges are imposed, charges for long distance usage are reduced. A subscriber line charge of $1.00 was first imposed in 1985. It was increased to $2.00 in 1986 and $2.60 in 1987. Although the FCC had first proposed a $6.00 charge for residential subscribers, it now proposes to cap these charges at $3.95 in 1989.

UNBILLED CALLS -- A number of calls which can be made without incurring additional charges above the fixed monthly charge for service. With flat rate service, all local calls are unbilled. Measured service plans may include a specific number of local calls that are unbilled.

UNIVERSAL SERVICE -- A policy, outlined in National Communications Act of 1934, of ensuring the availability of telephone service to all people of the United States at reasonable charges.

APPENDIX B:

THE AARP/AT&T/CFA STUDY ON THE EFFECTS OF DIVESTITURE:

PROJECT SUMMARY

BACKGROUND

In February 1986 the American Association of Retired Persons (AARP), the American Telephone and Telegraph Company (AT&T) and the Consumer Federation of America (CFA) commenced the largest joint consumer-industry research project in the history of the telephone industry and perhaps any other industry. The goal was to create a data base large enough on both a national and state-by-state basis to answer some of the myriad of questions about telephone use and behavior that had cropped up in the wake of divestiture and to challenge industry and consumer groups to provide solutions to outstanding problems in the rapidly changing, reorganized telecommunications industry.

The public interest nature of the project was defined not only by the joint management of the research, but by the fact that the raw data is available to all members of the industry, public interest groups and research institutions. Only time will tell whether the ultimate goal of solving problems will be achieved, but one year later a large data base containing countless challenges to all stakeholders in the telecommunications industry exists.

Because of the availability of the basic analyses and the size of the data base and in light of the fact that the primary goal of the project was to create a public resource, this project summary focuses on basic patterns observable in the data and the challenges that the project sponsors believe these patterns pose to industry and consumer groups. Far from being a comprehensive exploration of the data, the project summary is intended to stimulate interest in the data base.

THE SURVEY

Approximately 3300 interviews have been conducted consisting of

- a national sample representative of general consumers;

- four state samples representative of elderly consumers with phone service;
- four state samples representative of low income households with phone service;
- three state samples representative of low income households that do not have phone service; and
- an exploratory survey of disabled telecommunications consumers.

The survey instrument, which embodies a core of identical questions across all populations, varied from approximately 25 minutes for the telephone interviews, much longer and more detailed than the typical telephone survey, to almost an hour in the case of the disabled consumer interviews.

The areas covered in the research instrument include

- basic demographics of households,
- local service choices including type of service and equipment,
- long distance service choices,
- patterns of usage and telephone bills including potential problems that a lack of telephone service might cause,
- the extent to which consumers consider various types of calls absolutely necessary,
- the ease or difficulty of acquiring information about various aspects of telephone services, and
- patterns of information acquisition about health and education matters.

The demographic data gathered is more extensive than frequently found in telephone survey research. Based on a review of previous research which identified demographic factors that significantly affect telephone subscribership or use, data was gathered on the following variables.

- sex of respondent,
- household income,

- education of respondent,
- household size,
- primary language spoken at home,
- Hispanic origin of respondent,
- presence of a disabled person in the home,
- region of the country,
- receipt of public assistance,
- the proportion of household members less than 6 years old,
- the proportion of household members between 6 and 13,
- the proportion of household members older than 65,
- age of household head, and
- race of respondent.

While the three sponsoring organizations jointly managed the project and took responsibility for general research design, three independent organizations were retained to take responsibility for data gathering, compilation and preliminary analysis. From over eighty survey organizations and universities that responded to a publicly announced request for proposal,

- Opinion Research Corporation was selected to conduct the telephone survey and to provide overall project management,
- Westat Corporation was chosen to conduct the in-person interviews of households without phone service and
- Galludet University was selected to conduct the survey of disabled consumers.

The national and state samples are now available to all -- at the cost of reproduction -- on data tape suitable for mainframe use or data disks for use on microcomputers. Twenty volumes of preliminary descriptive statistics and contractor analyses are also available at cost.

ATTACHMENT MNC-5

RECENT ESTIMATES OF THE ELASTICITY OF DEMAND FOR ACCESS AND USE

STUDY	ELASTICITY OF DEMAND FOR: (ALL ELASTICITIES ARE NEGATIVE)	
	ACCESS	USE
ALLEMAN	.17	NA
BEAUVIS	.02	NA
BO	.17	.41
CARR	.04	.21
DOHERTY	.09	.42
DRI	.08	.25
EGAN	.04	.12 TO .51
HEIDT	.20	NA
JENSIK	.12	.14
MAHAN	0	NA
MILLER	.08	NA
NYT	NA	.21
PERL (BELL,1978)	.09	NA
PERL (BELL, 1983)	.09	NA
PERL (GTE, 1984)	.04	NA
SNET	NA	.21
STERN	.01	NA
WILKINSON	.15	.23

SOURCES: See Next Page.

ALLEMAN, MAHAN, HEIDT: Common Carrier Bureau, Analysis of the Effects of Federal Decision on Local Telephone Service: A Report after Inquiry in CC Docket 83-788, December 9, 1983, p. 27.

BEAUVIS, BO JENSIK, STERN, WILKINSON: Gary Bowman and Wayne A. Morra, Demand for Access and Use of the Telephone Network: A Critical Review of the Literature, conducted for GTE Service Corporation, Final Report, January 12, submitted by the Iowa State Commerce Commission in FCC Docket No. 83-788.

CARR: "Direct Testimony of Michael T. Carr," before the Public Service Commission of the State of New York, on behalf of New York Telephone submitted by the New York Department of Public Services in FCC Docket No. 83-788.

DOHERTY: "Direct Testimony of Noel Doherty," before the Public Service Commission of the State of New York, submitted by the New York Department of Public Services in FCC Docket No. 83-788.

DRI: Data Resources, Inc., Critique of Service Demand and Cost Models Developed by the Southern New England Telephone Company, July 1, 1982, submitted by the State of Connecticut Department of Public Utility Control in FCC Docket No. 83-788.

EGAN: Bruce L. Egan, "Direct Testimony on Behalf of South Western Bell," before the Public Service Commission, State of Missouri, PSC No. TR-83-253; submitted as Attachment 1 to Comments of Southwestern Bell Telephone Company, FCC Docket No. 83-788.

MILLER: "Direct Testimony of Richard C. Miller; Direct Testimony of Laurits R. Christensen," both on Behalf of New York Telephone before the Michigan Public Service Commission, submitted by the Michigan Public Service Commission in FCC Docket No. 83-788.

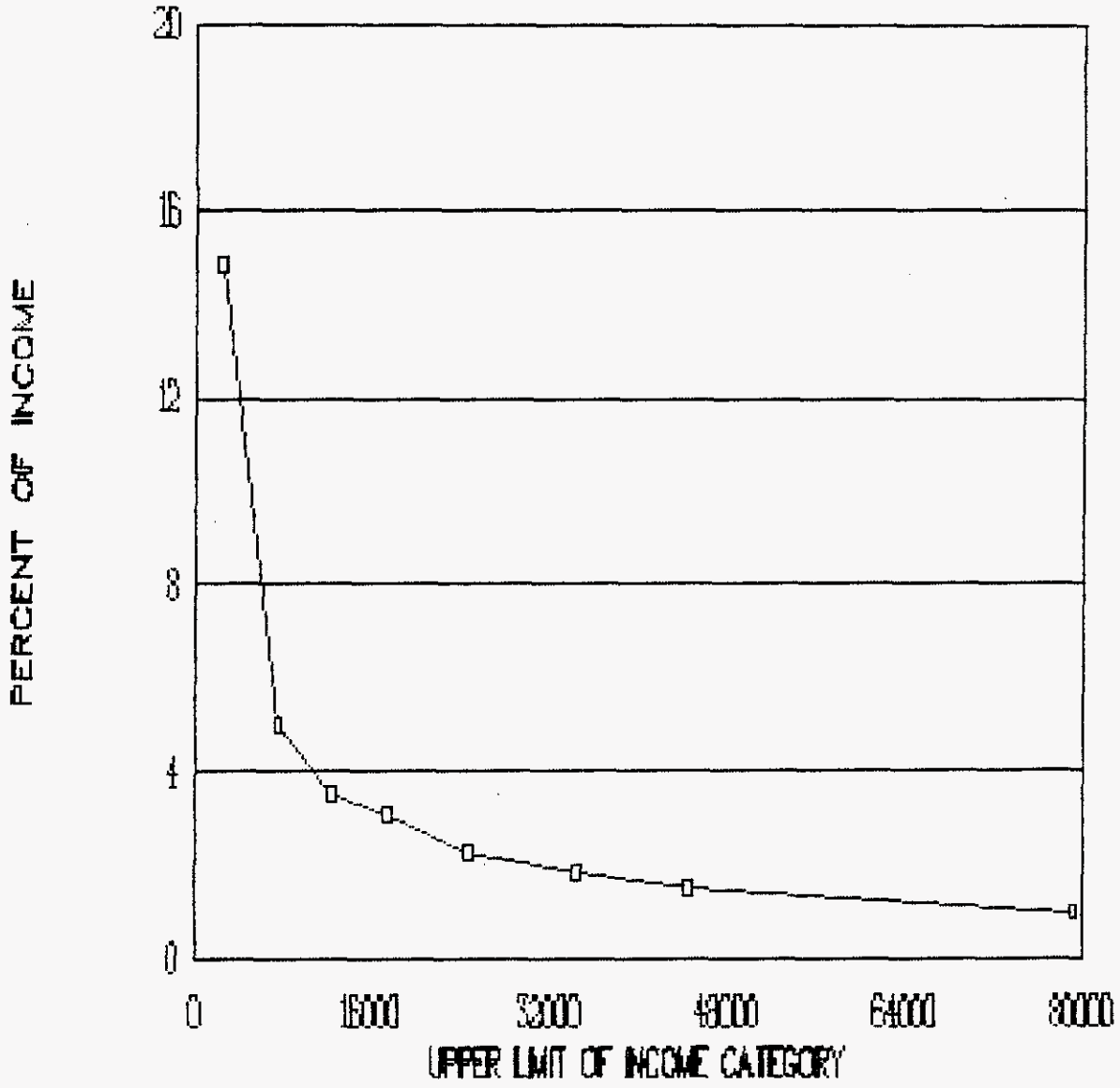
NYT, SNET: Lestor D. Taylor, Telecommunications Demand: A Survey and Critique (Cambridge: Ballinger, 1980)

PERL 1970: "Testimony of Lewis J. Perl on Behalf of Pacific Telephone and Telegraph," Before the Public Utilities Commission of the state of California, Applications Nos. 82-11-07, 83-01-22, 83-04-02.5.

PERL, 1980: Residential Demand for Telephone Service In Areas Served by GTE (National Economic Research Associates, August 29, 1984).

ATTACHMENT MNC-6

PERCENT OF INCOME DEVOTED TO TELEPHONE SERVICE



U.S. Department of Commerce, Bureau of Labor Statistics, Consumer Expenditure Survey: 1988/89.

ATTACHMENT MNC-7

Richard Gable, The Impact of Premium Telephone Services on the Technical Design, Operation and Cost of Local Exchange Plant (American Association of Retired Persons, January 1992).

January 1992 C-30

THE IMPACT OF PREMIUM TELEPHONE SERVICES ON THE TECHNICAL DESIGN, OPERATION AND COST OF LOCAL EXCHANGE PLANT

By

Richard Gabel

The Public Policy Institute was formed in 1985 as part of the Division of Legislation, Research and Public Policy of the American Association of Retired Persons. One of the missions of the Institute is to foster research and analysis on public issues of interest to older Americans. This paper represents part of that effort.

The views expressed herein are for information, debate and discussion, and do not necessarily represent formal policies of the Association.

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EXECUTIVE SUMMARY

This paper analyzes the impact of providing three premium services -- long distance service at the turn of the twentieth century, direct distance dialing in the middle of the century, and now intelligent network services at the end -- on local telephone exchange plant. The report applies an analytic model of technological change to these three major changes in telephone service. In this model, technological changes are responses to engineering and design problems posed by the provision of new services over existing local telephone exchange plant. Making new services available over existing facilities necessitates a variety of technical transformations, affecting:

* Transmission medium over which communications occur.

* Switches, which determine how messages are routed.

* Signaling systems, which determine how the flow of traffic is controlled.

* Numbering systems, which determine how messages are identified.

* Accounting systems, which determine how transactions are recorded and billed.

As a result of these technical transformations the very organization of the network, who talks to whom and what constitutes communication, is transformed. The success of new services depends not only on technical changes to transmission, switching, etc., but also on the magnitude of the costs associated with those changes, how regulators allocate those costs among existing customers, and how prices for services change as a result of these decisions. The model considers all these factors as they affect both new and existing services. The results of the model are summarized in Table ES-1.

The paper shows that previous instances in the addition of premium services imposed costs on local exchange plant because that plant, which was utilized by all services, had to be upgraded to meet the most rigorous needs of the most demanding services. While the addition of premium services enhanced the quality of telephone service, lax regulatory mechanisms resulted in the misallocation of costs. Premium services brought cost increases, but regulators failed to study cost causation closely. As a result, regulators accepted telephone company arguments that basic service did not cover its costs, when the opposite was actually the case.

The historical misallocation of costs pales in comparison to the potential misallocation of intelligent network service costs. In the next several decades hundreds of billions of dollars will be spent upgrading the telephone network, shifting its focus from voice uses to data and video uses.

This paper demonstrates the need for careful cost causative analysis. The cost

disadvantages of the intelligent network technology far outweigh the cost advantages for basic service, and the economic impact of the deployment of these technologies will be to raise total costs considerably. In the past, combinations of cost reduction and revenue growth resulting from the introduction of new services permitted overall price declines, cushioning the burden of cost misallocation, but that is unlikely to occur with intelligent network services. The costs are so large, the benefits are so heavily concentrated in specialized services and the demand for those services is so uncertain that the possibility of price reductions is very small.

Unfortunately, state commissions have not adopted appropriate approaches to allocate the costs of intelligent network services under their jurisdiction. The report urges regulators to recognize that the incentives for creating the new plant are solely directed to meeting the needs of new and premium services. Consequently, they will need to develop allocation methods that consider the cost impacts of premium services.

TABLE ES-1

THE IMPACT OF PREMIUM SERVICES ON LOCAL EXCHANGE PLANT

		Melding Long Distance and Local	Conversion to Direct Distance Dialing	Conversion to the Intelligent Network
PROBLEM	What technical problems does the provision of a particular service create?	Signal attenuation results in separate networks which cause inconvenience	Cumbersome and inconvenient operator interconnection	Slow, noisy voice network inhibits broad deployment of advanced services
TECHNICAL SOLUTION:				
Network Organization	Who talks to whom and how is that connection established?	Integration of local and long distance	Ubiquitous direct user interconnection	Transform voice network into digital network
Transmission	What is the medium over which the communication is sent?	Grounded cable to metallic cable with loading coil and repeaters (1890-1910); staggered twisted pair (late 1920s)	[Open wire/FM to coaxial cable, satellite, microwave]*	[Broadband fiber optic cable and T-1 carrier]
Switching	How are messages routed between subscribers?	Manual ringdown	Automatic analog	Digital
Signaling	How is the status of the system indicated to control the flow of traffic?	Manual D.C. loop in-band	A.C., E&M and SF in-band	Out-of-band SS7
Numbering	How are messages addressed?	7-digit	10-digit	11 to 15-digit
Accounting	How are accounts identified and transactions recorded?	Manual	Automatic accounting	[Computerized]
COST	How much does it cost to deploy the necessary equipment?	35 percent increase in local exchange plant	43 percent increase in central office equipment	Hundreds of billions
REGULATORY RESPONSE	How do regulators treat the increased cost?	Federal: Nominal	Station-to-station allocates weighted cost to long distance but is 90% local	Subscriber line charge, joint cost order -- 90% local
		State: generally none	Value of service residual pricing, intra/interstate rate equalization	Few have policy. Some have abandoned basic economic tests
PRICE IMPACT	How do prices reflect regulatory decisions?	1900-1940: local up 33%; Long distance: short haul down 20% long haul down 65%	1949-1959: local up 27% Long distance: interstate up 6% intrastate up 13%	Unknown

* Entries in brackets are not discussed in this paper but are an important part of the ongoing debate over the deployment of intelligent network services.

I. INTRODUCTION, ANALYTIC FRAMEWORK, OVERVIEW AND POLICY RECOMMENDATIONS[1]

A. Introduction

Throughout its history, the design of local exchange plant facilities has undergone successive transformations to meet the needs of premium communication services which utilize this plant in common with the provision of basic service.

* The development of long distance (toll) service and its integration with local service and the abandonment of separate local and toll networks was one such instance.

* The evolution of message toll from manual, to operator-assisted service, to fully automatic, customer-dialed handling was another step in the progress of telephony.

* Today, the provision of information services over local exchange facilities and the abandonment of separate voice, data and video networks mirrors earlier patterns of the development of premium services.

While the historical process of this development is well known, the extent to which the costs of this transformation were borne by basic exchange ratepayers is barely recognized.

B. Purpose and Analytic Framework

1. Purpose

The purpose of this paper is to examine the impact of the provision of premium services on the technical design, operation, and cost of local exchange plant and implications of their provision for local rates. It begins with historical examples to gain a better understanding of the process of change, but the primary focus of the report is on contemporary technological changes ongoing in the telephone network.

This paper does not offer a prescription for the 'best' method of cost allocation, nor does it seek to present an exhaustive compendium of technological change in the past century. Rather, it seeks to address a prior and perhaps more fundamental issue. It seeks to establish the factual basis for insisting on a careful cost causative analysis of technological change in the first place. It does so by reviewing repeated instances of major technological changes throughout the history of the industry in which the failure to engage in sound cost causative analysis led to serious misallocation of costs to basic local exchange service. The issue has

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[1]Dr. Mark N. Cooper provided a major contribution to the analytic framework in this chapter.

never been whether or not to permit technology, the question has always been who pays for it.

This chapter first provides an analytic framework for understanding technological change in the telecommunications industry, and then briefly applies this model to three case studies: the integration of long distance into the local exchange network; the conversion of the local exchange network to direct distance dialing; and the conversion of the local exchange network to the Intelligent Network. Chapters II and III develop the model more fully. Table I-2 provides a detailed summary of the model.

2. Analytic framework for understanding technological change

The most exacting requirements of the most exacting (premium) service are the drivers of cost in the telecommunications network. In order to understand the impact of premium services it is necessary to consider how the addition of premium services has interacted with and been determined by technical, economic, and regulatory constraints.

The history of technological change in the telecommunications industry can be broken down into five steps, which are roughly sequential (see Table I-1).

1) Problem: What functions do people or companies want the telephone network to perform? What operational characteristics do the functions require?

2) Technical Solution: How does the system work in order to get the job done? What are the design considerations (solutions) that drove the changes in the network?

3) Cost Implication: What capital costs does the technology require? How much does it cost?

4) Regulatory Response: How do federal and state regulators identify costs and allocate them for recovery in rates?

5) Price Impact: Who pays? How do price trends during the period of technological change reflect regulatory decisions?

For each of the major changes in the industry studied in this paper, all five of the above steps are considered. Special attention is given to step 2, the technical changes necessitated by the addition of premium services. For each major change in the telecommunications network that is studied, the impact of the addition of new services on one or more of the key technical building blocks of a telecommunications network is examined. These are the things a telecommunications network has to do in order to function. A technological change will

TABLE I-1

FRAMEWORK FOR ANALYZING TECHNOLOGICAL CHANGE
IN THE TELECOMMUNICATIONS INDUSTRY

PROBLEM ⬇	**WHAT TECHNICAL PROBLEMS DOES THE PROVISION OF A PARTICULAR SERVICE CREATE?**
TECHNICAL SOLUTION ⬇	**WHAT EQUIPMENT OR ORGANIZATIONAL CHANGES ARE MADE TO OVERCOME THOSE PROBLEMS?** Network Organization: Who talks to whom and how is that connection established? Transmission: What is the medium over which the communications are sent? Switching: How are messages from one subscriber to another subscriber routed? Signaling: How is the status of the system indicated for purposes of controlling the flow of traffic? Numbering: How are messages addressed so that they can get to their destination? Management of accounting: How are accounts identified and transactions recorded for billing purposes?
COST IMPLICATION ⬇	**HOW MUCH DOES IT COST TO EFFECTUATE THE CHANGE AND DEPLOY THE NECESSARY EQUIPMENT?**
REGULATORY RESPONSE ⬇	**HOW DO REGULATORS TREAT THE INCREASED COST (OR REVENUE) THAT FLOWS FROM THE SOLUTION?**
PRICE IMPACT	**HOW DO THE CHARGES FOR VARIOUS SERVICES REFLECT REGULATORY DECISIONS?**

not have a significant impact on the network if it does not significantly affect one or more of these building blocks:

* Network Organization: The basic way a system is set up and the users of the system interact.

* Transmission: The medium over which the communications is sent.

* Switching: The manner in which traffic finds its way from origin to destination.

* Signaling: The manner in which the status of the system is indicated for purposes of controlling the flow of traffic.

* Numbering: The way messages are addressed so that they can get to their destination.

* Management of accounting: Provision for system management to allow billing, etc.

Table I-2 summarizes the results of the model (the same table also appears in the Executive Summary).

3. The importance of cost causation analysis

This paper is based on the premise that in order to answer the fundamental question of regulation "who should pay?" -- one must understand how the telephone system is designed. One must know what causes costs to be incurred and which services benefit from the deployment of specific pieces of costly capital equipment.

This cost causative analysis is necessary for both economic and equity reasons. If costs are not properly attributed to the services which cause them, prices will not be properly set. If prices are not set to properly reflect costs, resources will be misallocated and income will be transferred from the subscribers of the overpriced service to the subscribers of the underpriced service.

Thus, pricing which is not based on good cost causative analysis is both inefficient and unfair. The fact that cost allocation in a complex network like the telephone system is difficult is not an excuse to neglect cost causative analysis; it is a reason to expend even greater effort on this crucial task.

TABLE I-2

THE IMPACT OF PREMIUM SERVICES ON LOCAL EXCHANGE PLANT

		Melding Long Distance and Local	Conversion to Direct Distance Dialing	Conversion to the Intelligent Network
PROBLEM	What technical problems does the provision of a particular service create?	Signal attenuation results in separate networks which cause inconvenience	Cumbersome and inconvenient operator interconnection	Slow, noisy voice network inhibits broad deployment of advanced services
TECHNICAL SOLUTION:				
Network Organization	Who talks to whom and how is that connection established?	Integration of local and long distance	Ubiquitous direct user interconnection	Transform voice network into digital network
Transmission	What is the medium over which the communication is sent?	Grounded cable to metallic cable with loading coil and repeaters (1890-1910); staggered twisted pair (late 1920s)	[Open wire/FM to coaxial cable, satellite, microwave]*	[Broadband fiber optic cable and T-1 carrier]
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COST	How much does it cost to deploy the necessary equipment?	35 percent increase in local exchange plant	43 percent increase in central office equipment	Hundreds of billions
REGULATORY RESPONSE	How do regulators treat the increased cost?	Federal: Nominal.	Station-to-station allocates weighted cost to long distance but is 90% local	Subscriber line charge, joint cost order -- 90% local
		State: generally none	Value of service residual pricing, intra/interstate rate equalization	Few have policy. Some have abandoned basic economic tests
PRICE IMPACT	How do prices reflect regulatory decisions?	1900-1940: local up 33%; Long distance: short haul down 20% long haul down 65%	1949-1959: local up 27% Long distance: interstate up 6% intrastate up 13%	Unknown

* Entries in brackets are not discussed in this paper but are an important part of the ongoing debate over the deployment of intelligent network services.

4. Common local exchange plant and local telephone service

To aid the analysis of cost causation, it is extremely important to emphasize the distinction between basic local telephone service and the common local exchange plant.

* Basic local telephone service is simply voice telephone connections within a specifically defined local service area.

* Common local exchange plant is comprised of those facilities that are physically located within the local area, but are used to supply both the basic and the premium services in common.

The local exchange facilities are common facilities for the different kinds of services that are provided over them. When we say that a facility is common, it simply means that it is utilized by many service classifications. For example, the local loop normally consists of a metallic wire pair which connects the subscriber to his local central office. The subscriber originates and receives local exchange calls, intrastate message toll calls, interstate message toll calls and various forms of data traffic. Each of these service classifications utilizes the local loop as common plant.

The engineering design standards and the investment and expenses incurred for local exchange plant are determined by the variety of uses to which those facilities will be put. When exchange plant is engineered, it is done in such a way as to accommodate the most exacting requirements of the most exacting (premium) services which utilize these facilities.

C. Case Studies

1. Introduction

For many years regulators have accepted telephone company arguments that local exchange telephone service has been subsidized by revenues generated by long distance services. The history of the development and operation of the industry indicate otherwise. That history is characterized by four interrelated themes:

* Basic local exchange plant is generally simple to design and relatively inexpensive to operate and maintain. The services that can be offered over basic local exchange plant are also relatively simple, e.g. plain old (voice) telephone service (POTS).

* Over time, telephone companies have offered more complex, premium services such as long distance services over local exchange facilities.

* The effort to accommodate the technical requirements of the more complex, long distance services has imposed numerous and frequently expensive modifications of otherwise inexpensive local exchange facilities.

* Rate regulators did not properly attribute the costs of those expensive modifications to the services which demanded them. By assigning the increased cost to basic local service, rather than to the services which caused them, they created the illusion that local service did not pay its fair share. In fact, it was carrying a larger share of the costs than the benefits it derived from the technological advances.

The story of long distance cost allocation might be just a quaint vignette of ancient history, if history did not have a troubling way of repeating itself. Today we stand on the verge of another major effort to reconfigure the telephone network to accommodate a much more varied mix of premium services.

Video and data services reflect fundamentally different types of service, each of which imposes additional technical standards and costs on the local telecommunication system. For example, data communication requires different, higher quality signals because computers cannot filter out noise on the line that the human ear filters out in the normal auditory process. In addition, both video and data generally require much more speed and carrying capacity (bandwidth) than voice in order for transmission to be fully effective.

The present public switched telephone network was engineered for voice-grade services, driven by the costs of long distance service. While the existing network structure is perfectly satisfactory for this purpose, it is unsatisfactory for transmission of medium and high-speed data. Hence, it is being converted from voice (analog) to digital at an accelerating rate to accommodate the higher technical requirements of data services (Freeman, 1989 and Crowley, 1962).

Local exchange plant will again be used as a common facility to supply local telephone service and an increasing variety of "premium" services that impose increased costs on the common local exchange plant. If the costs of those services are again misallocated to local telephone service, history will repeat itself. By most estimates, the stakes are huge. In the next several decades hundreds of billions of dollars will be spent upgrading the network from a focus on voice uses to a focus on data and video uses.

Appropriate allocation of these costs has become more critical because the current round of technology deployment is fundamentally different than in prior periods. In the past, combinations of cost reduction and demand growth could quickly cushion the burden of cost misallocation, but that is highly unlikely in the intelligent network. The costs are so large, the benefits so heavily concentrated in specialized services and the demand for those service so uncertain that the near to mid-term possibility of price reductions is very small.

2. Integrating long distance into the local exchange network

At the very beginning of the telecommunications industry, local and long distance service were delivered over separate networks. The technical problem was that sending telephone signals over long distances was considerably more difficult than telecommunications over

shorter local distances. As a result, two different technologies were utilized. Local service was delivered to the home of individual subscribers over a single wire. Long distance service was offered between telephone company central offices over two wires.

Integrating the two systems greatly improved the convenience of long distance service, but it also imposed heavy costs on local exchange plant, since that plant had to be upgraded to meet the demands of long distance communications. The costs of this change were imposed almost entirely on local customers, rather than long distance customers. The local exchange companies and their customers were used both to absorb the costs of long distance service and to undercut competing independent telephone companies.

The price changes over this period reflected the preferential treatment afforded to long distance service, in spite of the high demands it placed on the network. While the price of local service increased from the early twentieth century until World War II, long distance rates declined steadily. Between 1900 and 1940 local rates increased by over 30 percent, while long distance rates declined by over 60 percent (see Table II-2). The reduction in charges for long distance rates can be attributable only in part to the enormous improvements in interexchange technology that occurred over this time period.

3. The conversion to direct distance dialing

The image of rows of operators plugging and unplugging telephone lines to complete calls is a classic telephone industry symbol. The interaction with the operator was cumbersome, requiring the caller to say who he or she wanted to call and then waiting for the operator to connect through to another operator who would ring the desired number.

Without major technological changes, however, this interaction was unavoidable because a great deal of work was done by the operator. The manual functions performed by the switchboard operator included trunk selection, signaling, timing and ticketing of calls. These functions had to be supplanted by various mechanized processes for direct subscriber interconnection to be achieved. An additional, and perhaps more interesting requirement, was the introduction of a uniform, nationwide numbering system.

Thus, enormous changes and improvements in the makeup and design of local exchange plant were necessary prior to the introduction of Direct Distance Dialing (DDD). Five requisites had to be met in order for direct distance dialing to be achieved:

* Conversion to local dial services,

* Mechanization of billing and accounting,

* Modification of the signaling system,

* Improvement in switching equipment, and

* Development of a uniform numbering system.

All of these requisites to DDD had major cost impacts. Although these were largely improvements necessitated by long distance (toll) service, the bulk of the additional costs were borne by local exchange ratepayers. Although court cases had led to the use of more sophisticated cost allocation formulas by the time of this conversion, these allocation formulas still placed the overwhelming majority of the burden on local ratepayers.

Consistent price data is available for the period of conversion from manual to Direct Distance Dialing. Although, expensive technical changes to implement DDD were the critical factor driving costs in the industry during the years 1949-1960, the price of basic local service rose by 27 percent between 1949 and 1959, while interstate long distance (toll) rates increased by only 6 percent and state toll rates by 13 percent.

4. The Intelligent Network

The changes necessary to achieve an Intelligent Network are even more demanding than those involved in DDD. The current telephone network has been "optimized" for voice service. Moving data or video is quite another matter. From the point of view of a data network, the voice network is noisy, slow and relatively narrow.

The demands of data communication are fundamentally different than the demands of voice. Some key differences are described below.

DELAY SENSITIVITY :

Voice: High Sensitivity -- Silence in human conversation conveys information so that the voice network cannot add (or remove) periods of silence.

Data: Low Sensitivity -- Most data do not alter in meaning if they are delayed in the network for a few seconds; a packet containing temperature information for the Chicago airport will not change in meaning because of the addition or removal of a short delay in the network.

HOLDING TIME:

Voice: Long -- Telephone calls usually last for a relatively long time compared to the time necessary to set up the call. While it may take 3 to 11 seconds to set up a telephone call, the average local call lasts for about 180 seconds (3 minutes) and a toll call for about 300 seconds (5 minutes).

Data: Short -- Most data traffic is bursty; i.e., the bulk of the data is transmitted in a short period of time, such as checking on a credit card (interactive applications). A 90-10 rule is often cited to demonstrate this: 90 percent of

the data is transmitted in 10 percent of the time. Since data transmission will tend to be very fast, long call setup time provides inefficient networks for data service in contrast to voice transmission.

FREQUENCY

Voice: Narrow -- A 3.1 khz passband is sufficient for human voice. Increasing the bandwidth available for the voice call does not affect the duration of the call.

Data: Wide -- Data can use all of a channel's available bandwidth. If additional bandwidth is made available for a data call, the duration of the call can decrease while the speed of transmission can increase. The wider spectrum for voice traffic with its long conversation times becomes an inefficient and redundant use of plant. Data networks operate efficiently at 64 khz.

The limitation of the analog network for premium services can be summarized by noting that it takes over two minutes to send a page of facsimile over an analog network, while it takes about 5 seconds to send it on a digital network.

Converting the telephone infrastructure from voice to data or video is a massive undertaking. The telephone companies propose deploying an Integrated Services Digital Network (ISDN) composed of:

* Fiber optic cable.

* Digital switches.

* An entirely new signaling system (SS7).

The cost and complexity are commensurate with the size of the undertaking. Although it is difficult to know precisely how much the overall cost will be, it is clear that it will be in the hundreds of billions of dollars (Wigand, 1988).

These technologies will raise the cost of providing service. Given these large costs, only increased revenue can hope to make the technologies a net economic benefit to the overall network. Future revenues cannot be credibly projected, however. Independent analysts have predicted that voice communications will continue to generate the greatest portion of ISDN traffic (Strock, 1989, 180 and Finneran, 1991). The vast majority of users will benefit little, but they will bear the costs unless costs are allocated appropriately.

D. Policy Conclusion: Protect Local Exchange Customers

The current replacement of voice-grade (analog) facilities by digital switching and transmission are analogous to the events at the turn of the century when local and long distance were integrated. Consolidation of local exchange and long distance facilities introduced economies of scope in the early days of the industry. But the costs of consolidation were largely borne by local exchange ratepayers, while the benefits accrued to the toll customers.

Policymakers are confronted by a parallel question today as the industry seeks to further modify local exchange plant as part of the desire to accommodate high-speed data and broadband service classifications. POTS customers will receive few service benefits from the development of digital facilities.

The urgency of the policy problem is underscored by the current status of the deployment of intelligent network technologies. The telephone companies have not yet significantly deployed SS7 and ISDN, but they are on the verge of doing so on a very large scale. The Bell Operating Companies (BOCs) are proposing to integrate their conventional local exchange plant digital facilities with independent high-speed data and information networks and accelerate the deployment of these integrated facilities. The BOCs and the major interexchange carriers completed limited ISDN trials in 1990. Almost all major PBX manufacturers that market in the United States have indicated that ISDN-compatible products are either available or under development.

Table I-3 reports the number of Bell Operating Company central offices equipped for ISDN and SS7 service and the number of equipped access lines for the years 1987 and forecast through 1994. It is clear that midway into the 1990 decade ISDN development will continue to be at the periphery of BOC operations. Because new services made possible by SS7 have greater potential to enhance revenues than ISDN-based services, which have yet to generate customer interest, the BOCs have moved more rapidly with the installation of SS7 than ISDN.

TABLE I-3

CENTRAL OFFICES (COs) AND LINES EQUIPPED FOR ISDN AND SS7
BELL OPERATING COMPANIES: 1987-1994

	ISDN						SS7					
	Central Offices			Telephone Lines			Central Offices			Telephone Lines		
Year	Total	ISDN	% ISDN	Lines	ISDN	% ISDN	Total	SS7	% SS7	Total	SS7	% SS7
1987	9,237	4	0.0	96,654	1	0.0	9,237	29	0.3	96,654	1,035	1.1
1988	9,348	82	0.9	99,524	43	0.0	9,348	435	4.7	9,524	10,325	10.4
1989	9,389	179	1.9	102,648	99	0.1	9,389	950	10.1	102,648	21,555	21.0
1990	9,406	426	4.5	105,844	496	0.5	9,406	2,083	22.1	105,844	36,706	34.7
1991	9,393	1,595	17.0	109,228	1,059	1.0	9,393	3,087	32.9	109,228	52,250	47.8
1992	9,373	1,764	18.8	112,476	1,370	1.2	9,373	4,101	43.8	112,476	66,394	59.0
1993	9,375	1,962	20.9	115,700	1,888	1.6	9,375	4,895	52.2	115,700	78,645	68.0
1994	9,366	2,269	24.2	118,961	2,218	1.9	9,366	5,362	57.2	118,961	86,964	73.1

Note: 1987-88 Actual; 1989-94 Projected

Source: CC Docket89-264, Initial Submission, Attachment B, Table 104, Federal Communications Commission

Still, SS7 has developed slowly to date. At the end of 1988, only about 10 percent of the RBOC's lines had access to the new signaling system. But, according to telephone company projections made in 1989, growth will occur rapidly beginning in 1990. By year-end 1994, the carriers expect that nearly three-fourths of their lines will be accessible to SS7.

With costs about to be incurred, there is certain to be a major round of debate over cost allocation and cost causation. Regulators can greatly affect the deployment of the technology and the impact that it has on rates for basic and premium services.

The potential benefits of ISDN and SS7 may be great, but most of these benefits will be realized for new services, not basic service, and will not be realized until many years into the future, if at all. Yet, to obtain these benefits, the telephone companies must undertake substantial up-front investment in new network technology and prematurely retire existing analog facilities. Both economic efficiency and equity dictate that the costs of new investment should be borne by those who benefit by its application. As demonstrated in Chapter III, it is unlikely that the cost advantages of ISDN and SS7 will outweigh their disadvantages, at least until both are universally deployed, decades into the future.

By and large, the state regulatory commissions have not developed methods permitting the proper allocation of the costs of intelligent network services. Some state commissions have removed competitive services which utilize SS7 and ISDN from their regulatory scope. Approaching policy issues from the perspective of individual services is appropriate for some policy issues, such as determining the competitive status of various services, but it is not an appropriate way to approach the allocation of costs associated with SS7 and ISDN. ISDN and SS7 are new network concepts, not singular services. These network facilities will not only offer the established voice, data and video services available today, but will also provide as yet unknown future services as software develops.

The job of protecting the basic ratepayer has become increasingly complex. But no tenable solution is possible until regulators understand and carefully consider the problem. The commissions should recognize that the incentives for creating the new plant are solely directed to meeting the needs of new and premium services and that basic local exchange services should be insulated from any cost effects.

Rather than attempt elaborate cost allocation schemes on a service-by-service basis, commissions should consider allocating costs on the basis of generic service categories, such as voice POTS, voice long distance, data and video. One possible use of this method would involve assigning no more cost to the basic POTS classification than can be identified as necessary under "stand-alone" attribution, the cost of providing POTS alone, independent of the provision of other services.

Another suggested solution for this issue is for the regulatory commissions to defer capital recovery for those investments that can be attributed to future benefitted service categories.

This rate making question presents immediate cost allocation questions for services such as intelligent network services which require the new signaling system (SS7).

E. Outline of the Report

The remainder of the report is divided into two chapters. Chapter II deals with the historical example of long distance service impacting local exchange plant. Chapter III deals with the current round of technological innovation associated with "information age" services. Each chapter will follow the model outlined in Table I-1, whereby technological change is viewed as a response to the technical requirements of new services, and regulators' allocation of costs, and the resulting price changes, associated with technological change.

Within each chapter an effort is made to keep technical discussions to a minimum. More technical discussion is provided in an appendix at the end of the chapter for those interested in a greater level of technical detail.

II. THE TECHNOLOGICAL DEMANDS OF LONG DISTANCE SERVICE AND LOCAL EXCHANGE PLANT COSTS

This chapter will briefly review the history of the design of long distance service and the impact that it had on local exchange plant. Two major changes are examined, the integration of local and long distance service at the turn of the century and the introduction of Direct Distance Dialing in the 1950s.

A. The Integration of Long Distance and Local Service: Creating a Single Transmission System

1. Network organization: separate local and toll networks

The provision of communication over long distances was part of Alexander Graham Bell's "Grand System" concept of 1878. Although toll lines were constructed by the Bell System in limited locations, service was handicapped by the rapid weakening of signals over relatively short distances.

Long distance service was provided on a separate network from local service. Few customers subscribed to both toll and local service. For the majority of telephone users, placing a toll call involved traveling to AT&T's offices in a city.

The toll network involved connecting a customer to a separate toll switchboard through two wires, known as a metallic loop. The construction of local exchange plant, on the other hand, was modeled after the layout of outside plant by the telegraph industry. Local service was provided over one wire (known as a grounded loop since ground was used as the return path). Because of the difference in wiring, each service used a different type of transmitter and switchboard (Gabel, D., 1989).

AT&T conjectured that this inconvenience accounted for the slow growth in the demand for toll service. Consequently, the company chose to integrate its toll and local networks. Integration of the two separate networks, the company reasoned, would make it easier for customers to receive and send toll calls.

2. Technical problems: overcoming transmission problems

The technical problems of long distance signal amplification were alleviated with the invention of the loading coil and the mechanical repeater around the turn of the century (Fagen, 1975). Subsequently, integration of the two networks became technologically feasible and the local loop was converted to metallic cable capable of handling long distance service.

The manufacture of toll cable was also improved by World War I with the introduction of staggered twist pairs. At first, all cable pairs had a three-inch non-staggered twist. In

1920 staggered twist cables were introduced on toll cable that used two different lengths of twist in order to reduce cross-talk in adjacent pairs. Later, as many as five twists were used in a layer. These measures greatly improved cross-talk suppression (Fagen, 1975).

The telephone companies were reluctant to replace the non-staggered local exchange cable as had been done with toll cable, however. Most local calls are short-haul and the problem of cross-talk was not as severe as on long distance calls. It may also be surmised that the extent of plant replacement was a bottleneck; there was much more mileage of exchange cable in the network than there was of toll cable.

By the late 1920s the volume of long distance traffic had grown significantly. Western Electric, the manufacturing arm of the Bell System, discontinued the fabrication of non-staggered cable. In the following decades, thousands of miles of non-staggered local exchange cable plant was removed and replaced by staggered cable facilities in order to achieve satisfactory toll grade quality.[1]

The policy of integrating the networks had the effect desired by the company. As shown in Table II-1, the number of daily local exchange calls grew much more rapidly than the growth in toll calls. In 1883, subscribers averaged 4.76 local calls per day; by 1889 subscribers averaged 5.85 local calls per day. While the volume of toll traffic increased over this time period, it remained relatively constant compared to the increasing number of telephones. Between 1883 and 1889, the number of daily long distance calls per telephone remained at a constant ratio of .04 toll calls per telephone. It was not until 1893 and the succeeding years as the separate networks were gradually integrated, that toll volume shot upward. By 1920 the rate had quadrupled.

3. Cost impacts and the cost burden

a. The Magnitude and Incidence of the Cost Burden

This integration had a significant cost impact. Integration of local and toll facilities by metallicizing its local exchange cable pairs was estimated to increase local exchange costs by

[1] Information supplied by Mr. A. L. Issette, retired telephone engineer, Michigan Bell Telephone Company. Impairment of intelligence due to cross-talk continued to be a problem with data transmission. This is particularly true when "go" and "return" channels are carried in the same cable. When the two directions of transmission are carried in separate cables, cross-talk is eliminated. But separate cables result in lower average cable fill (Freeman, 1989).

TABLE II-1

NUMBER OF TELEPHONES, AVERAGE DAILY LOCAL AND TOLL CALLS, BELL SYSTEM COMPANIES: 1883-1920

Year	Telephones (000)	Average Daily Calls Local (000)	Average Daily Calls Toll (000)	Average Daily Calls Per Telephone Local	Average Daily Calls Per Telephone Toll
1883	124	590	5	4.76	.04
1885	156	747	7	4.79	.04
1887	181	1,012	7	5.59	.04
1889	212	1,240	8	5.85	.04
1893	266	1,872	34	7.04	.13
1900	836	4,773	149	5.71	.18
1905	2,285	11,404	368	4.99	.16
1910	3,933	18,256	602	4.64	.15
1915	5,968	25,184	819	4.22	.14
1920	8,334	31,836	1,327	3.82	.16

Source: "Historical Statistics of the U.S.: Colonial Times to 1957," U.S. Department of Commerce, 1960 ed., Series R-1-9, pp. 480-48[illegible], authors' calculations.

35 percent (Gabel, D., 1989). The costs of this service improvement were not distributed in a balanced fashion.

* Most of the financial burden, that is the cost of adding an additional wire to the outside plant facilities, was borne by local exchange ratepayers.

* The costs of upgrading the customer instrument and the switchboard operator equipment were also levied on the local exchange company.

Since AT&T owned a majority portion of each of the local companies, it experienced a proportional loss through the sharing of these costs. On the other hand, the toll company was the primary beneficiary. The development and attractiveness of toll were made possible by subsidies from local exchange customers.

This cost shift had powerful effects on local exchange costs. Given the structure of the industry, not only did local rates bear the burden, but so too did some stockholders of local companies. One seminal case provides interesting insight into this cost shift.

b. An Effort to Redress the Imbalance

In 1893, Alexander Bell's patent on the telephone transmitter expired. Almost overnight, competitors of the AT&T Co., known as Independent Telephone Companies, sprung up around the nation. The Independents were attracted to the provision of local service because of the high profits earned by AT&T during the patent monopoly period.[2] Widespread customer dissatisfaction with the quality of telephone service provided by AT&T also provided a market opening for the Independents (Gabel, R., 1967).

The Independents were most successful in the Midwest. The Central Union Telephone Company, AT&T's local operating company in Indiana, Illinois and Ohio fared poorly. Not only did it see its market share fall quickly from 100 percent to less than 50 percent, it also suspended dividend payments in 1894. Throughout the competitive period, 1894-1913, Central Union operated at a loss (Gabel, D., 1989).

Despite the losses experienced by its subsidiary, AT&T felt it could absorb the local company operating loss for a time in order to eventually destroy the competition. The American Company also took the long-range view of its toll market. Growth of its toll business had not been substantial because of its stand-alone network. The consolidation of facilities would eliminate the need for a stand-alone, toll network and expand the number of customers who could be directly reached over the toll lines.

The benefits of system integration were not universal. The capital costs of the conversion from grounded-to-metallic network upgrade were borne totally by the local company. AT&T did pay compensation to Central Union for connecting its toll lines to the local exchange plant, as well as for Central performing the billing and collection function for long distance calls. But the minority stockholders of Central Union objected. They filed suit in the Superior Court of Cook County, Illinois, charging that they had been compelled to take on costs which were advantageous to AT&T, but had received few benefits in exchange.

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[2] For example, between 1880-1899 AT&T paid out 51 percent of its revenue in the form of dividends (FCC, 1938, 584).

The minority stockholders (Read et al.) claimed that the decisions made by Central Union's board of directors were intended to promote AT&T's national position, but that these interests did not coincide with the interests of the minority stockholders. For years the market price of Central's stock had been approximately 25 to 50 percent of its par value. The complainants felt that the long term financial problems of the local firm had been largely an outgrowth of the competitive war which had been waged by Central Union on behalf of AT&T, and in order to best meet the interests of its majority stockholder, AT&T.

The minority stockholders believed that these sacrifices had been made with the understanding that they would share the future gains. Having experienced continuing operating losses since 1893, the minority stockholders believed they could recoup these losses as the competing Independent firms were bankrupted and market prices restored to profitable levels (Dever, 1917).

The court decided the case largely in favor of the complainants. The judge found that AT&T's holdings in Central Union were made with the intent to monopolize the industry. The judge ordered that the losses incurred by the local company due to rate cutting should be borne by AT&T in proportion to the benefits offered. More important to the point of the present paper, the judge found that Central Union stockholders were asked to sponsor the growth of AT&T's toll service. When the gains of the integrated network were not shared, the court found this to be in violation of the law. It ordered AT&T to share the costs of upgrading (metallicizing the local lines) "based on the extent to which it benefitted thereby (Dever, 1917)."

Central Union had helped to sponsor the growth of AT&T's integrated, nationwide system but was denied the opportunity to share in the benefits because of the contractual terms imposed by the parent company. Since AT&T had abused its fiduciary relationship with minority stockholders, the complainants were entitled to court-ordered compensation.

4. Regulation

As suggested by the court case, regulators generally failed to recognize that exchange facilities had to be modified to accommodate toll. Indeed, in these early days regulation was extremely weak. Consequently, costs were inappropriately increased in order to effect compatibility with the new requirements of the premium toll service.

The dominant method of allocating toll costs in telephone ratemaking has varied widely over time. In the early days of the industry the Bell System employed the "Board-to-Board" method of cost allocation. Under this costing system, all the common costs of local exchange plant were assigned to local telephone service and none to toll. This is the underlying problem challenged in the Read case.

The Illinois Public Service Commission also challenged this method after World War I, asserting that since toll service made use of the local plant and imposed costs, it should bear

a portion of the costs. This view was ultimately upheld by the U.S. Supreme Court in the case of Smith v. Illinois Bell (1930). That decision provided the foundation for the "Station-to-Station" method of jurisdictional cost separations which would be followed for almost half a century.

5. Price changes

The price changes over this period reflect the preferential treatment afforded to long distance service, in spite of the high demands placed on the network (see Table II-2). While the price of local service increased from the early twentieth century until the Second World War, long distance rates declined steadily. Between 1900 and 1940 local rates increased by more than one-third, while long distance rates declined by one-fifth for short distance, interstate calls and over two-thirds for longer distance calls. The reduction in charges for long distance rates has been attributable only in part to the enormous improvements in interexchange technology that occurred over this time period.

B. Direct Distance Dialing

1. Network organization: user interconnection

The integrated local and long distance telephone network created around the turn of the century relied on manual interconnection throughout the first decades of its existence. Interconnection involved customer-to-operator-to-customer connection. In the case of long distance it involved customer-to-operator-to-operator-to-customer connections. A major change in long distance service was the shift to Direct Distance Dialing -- customer-to-customer interconnection. To provide a uniform, nationwide Direct Distance Dialing service that would automatically interconnect millions of users through thousands of switching centers was a massive undertaking.

With manual switchboard service, the telephone operator, upon insertion of the line cord into the customer jack, would ring the called customer by use of a magneto generator or trip a signal tone to the called line. Under this system, toll switchboard operators were able to switch and dial long distance calls through to termination. They also manually recorded the necessary billing information. With the removal of the switchboard operator, automatic signaling (subscriber line signaling) had to be devised to operate concurrently with the selection of the called line circuit.

With this change, large-scale service upgrading in local plant was required. This change took place in various stages as manual switchboard operations were enlarged and extended. Changes in central office numbering schemes, toll routing, ticketing and billing of long distance calls, as well as upgrading of signaling and transmission methods were made necessary with the automation of plant operations required for DDD.

TABLE II-2

HISTORICAL PRICE TRENDS: 1900-1940

CALL TYPE	PERIOD	PERCENT CHANGE
Local[b,c]	1900-1940	+32
New York to Philadelphia (Toll)[a]	1902-1940	- 18
Local[b,c]	1913-1940	+45
New York to Denver (Toll)[a]	1911-1940	- 71
New York to San Francisco (Toll)[a]	1915-1940	- 81

Sources: a) "Historical Statistics of the U.S.: Colonial Times to 1957," U.S. Department of Commerce, 1960 ed., Series R-13-16, p. 784; authors' calculations.

b) "Primer and Sourcebook on Telephone Price Indices and Rate Levels ," Federal Communications Commission, Common Carrier Bureau, F.C.C., April 10, 1987, Appendix 7.

c) "The Economics of Competition in the Telecommunications Industry," I. Meyer and John Robert (Oelgeschlager, Gunn & Hain, 1980), p. 34.

Introduction of DDD was an evolutionary process. It began with telephone operators dialing calls straight through to the distant telephone, first, in a few cities, then over widening areas. As early as the 1930s some long distance calls were being dialed by switchboard operators between cities and towns within relatively small areas. In the late 1940s the Bell System introduced operator toll dialing more broadly.

Beginning around 1950, the telephone industry introduced DDD as both a service and economy measure in the provision of long distance service. The first community in which

telephone users could dial calls directly to distant points was Englewood, New Jersey. This was in 1951. Five years later, 11 million customers could dial nearby towns and cities. By 1965, 90 percent of telephone subscribers were able to use DDD. Today the service is universal.

2. Technical problems and design considerations

To provide this service, the first need was for switching arrangements that could produce a uniform service so that if the most immediate path through the network was busy, an alternate path would automatically be discovered, and for a numbering plan that could be applied nationwide. Above all, this meant that the local switching systems, which were of many varieties and vintages, had to be modified to understand the signaling characteristics and also to translate different inputs into a common language that would be understood through any path through the telephone system.

a. Switching

The first requisite was the need to provide local dial service in which the customer dialed directly through to other local telephone subscribers. Mechanization of local service was a prerequisite to customer long distance dialing. Many common battery manual offices underwent conversion to automatic dial service not for the economies rendered to local exchange service, but because of the expected savings and growth in long distance service.

Provision of local dial service in place of manual switchboard service was supplemented in many instances by the rehabilitation of outside plant. These modifications improved the quality of local service, but were essential to the introduction of DDD.

A second switching requisite was a much more sophisticated switching capability to deal with the problem of distant markets. To accomplish this, Bell Laboratories designed types of equipment additions to the then predominant switching machine - the Crossbar - that was more sophisticated than anything that had been attempted before.

As an example of this machine's upgraded capabilities, assume a coast-to-coast call is dialed at a time when all direct circuits are busy. A direct circuit is one between the city of origination to the terminating city. An alternate route circuit travels through one or more intermediate toll switching centers. The machine is programmed so that when it seeks to comply with the first three digits, and finds all direct circuits busy, it immediately signals, say Chicago, in quest of an alternate route. The Chicago machine checks the first three digits in turn and if it has a direct circuit clear to the destination, it sends the other seven digits on. The system will check a number of centers in search of an open path.

b. Accounting

Another necessity for DDD, was a method of keeping track of who calls where, at what

time and for how long. In a customer effectuated interconnect, the operator could no longer provide this function.

For this purpose, the industry developed an Automatic Message Accounting (AMA) system to record and process the information. This system generated electronically recorded, machine readable data for billing. Between 1948 and 1963 the Bell System installed message accounting centers to process AMA tapes. A wide AMA paper tape recorded the called and calling numbers, trunk number, type of billing, and times of beginning and end of each call. The tapes were read by machines at the accounting centers that produced monthly bills for customers (Joel, 1982. 120).

c. Signaling

No less essential to the success of DDD was the development of new methods of signaling.[3] This involved problems of both mechanization and signal strength. When operators started to dial calls straight through to the distant telephone, this was quite a different matter from manual signaling between switchboards, where signaling was accomplished by human operators at both ends. For customer dialing, with no operator

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[3] The basic requirements of a signaling system include:

Calling Subscriber's Line:

* seizure (off-hook) to indicate to the central office that a call is initiated;

* dialed address information (or oral address in manual system) to convey the identity of called telephone number; and

* clear forward (return receiver to cradle or restore on-hook condition) to indicate to the exchange that the call is terminated.

Called Subscriber's Line:

* answer (remove receiver--off-hook); and

* clear back (on-hook) to indicate to the central office that the call is terminated by the called party.

The basic signaling on subscriber lines may be considered as comprising two distinct signaling functions: supervisory and selection. The supervisory function serves to detect or change the state or condition of some element (in general, subscriber lines) of the network and reflect the subscriber's on-hook/off-hook conditions. This involves detection of any consequential changes of the state of lines from the idle to the busy condition, and vice versa. The selection functions are concerned with the call connection set-up process and are initiated by the caller sending the called party's address information.

involved, a further radical change in the signaling system was required. Subscriber line signaling may be regarded as being basic function signaling, signaling which is independent of the type of switching system and type of switched network. A consequence of the conversion to DDD was the rapid obsolescence of many millions of investment dollars in manual ringdown signal equipment.

Perhaps the most important factor affecting signaling for longer distance calling was the development of a.c. methods of signaling. The line plant in voice-grade networks is usually 2-wire unamplified audio and the line signaling is local direct current (d.c.) loop signaling. Local d.c. loop signaling has a limited range and some local d.c. signaling methods use single wire with return signaling in order to increase the signaling limit. Local d.c. signaling is relatively cheap, requiring one signaling unit per circuit; it is the simplest signaling method.

With tones it was possible to send supervisory and pulsing signals over the same distances as voice signals. A new concept was introduced, that of sending multiple tones that in combination represent a digit, in contrast to the single frequency, spurt tone. With the increase of toll calling and the necessity of signaling to greater distances than permissible under d.c. loop signaling, new and more expensive signaling systems had to be added to the local plant. Low frequency, alternating current (a.c.) or long-distance d.c. signaling was adopted when the local d.c. signaling limit was exceeded. This method required outgoing and incoming signaling terminals, which increased the cost relative to local d.c. signaling (Welch, 1981). (See the Appendix for further discussion of switching changes.)

d. Numbering

The fifth element essential to the conversion to DDD was a uniform numbering system where each telephone would have a unique designation. This designation would be based on a numbering plan for each local dial central office whereby each central office would be reached by a distinctive three-digit code.

The central office code at first consisted of a 2-letter prefix and 1-digit office prefix plus a 4-digit station number making up the subscriber local numbers (e.g., AL-6-3575). Although a 7-digit alpha-numeric designation was needed for toll dialing, as late as 1981, perhaps 45 percent of Bell System offices could complete local calls by using only 3 or 4 digits. (See the Appendix for further discussion of numbering changes.)

3. Cost impacts and the cost burden

All of these changes had to be introduced in both toll and Independent (non-Bell) local exchange facilities for DDD to work. The transition was done smoothly and effectively but with scant recognition of the cost burden imposed on local exchange service in accommodating to these message toll requirements. These toll costs were basically absorbed by local exchange ratepayers. After reviewing all major state telephone rate cases in the

Public Utilities Reports over the decade 1950-1959, the author found no evidence that state regulators recognized the impact of any of these changes on local exchange plant costs.

When the program got under way, nearly half of all Bell Operating Companies furnished manual switchboard service where operators provided the numerous functions of making subscriber connections, providing information service, disconnecting service upon call completion, providing the ringing signals and other supervisory tones. Table II-3 compares the number of Bell System central offices by type and by number of served telephones for the years 1948-1959. At the beginning of the period 47 percent of Bell central offices were either magneto or common battery manual. Manual offices were not candidates for DDD. By 1959, the combined Bell Companies were over 92 percent dial while the remaining manual offices served only 4 percent of Bell Telephone customers.

The average investment in central office equipment per telephone line increased 43 percent between 1948 and 1959. Under prevailing regulatory cost principles, about 90 percent of this higher investment was allocated to basic local exchange service.[4] As discussed below, local rates increased at a much more rapid rate over this period than toll rates.

4. Regulation

The advent of Customer Toll Dialing after 1950 was a technical and service event of major significance in the industry. As we have seen, DDD involved material changes in the composition of plant, i.e., switching, signaling and accounting equipment. These changes were made necessary in the effort to improve and expand message toll services. Therefore, the costs associated with these changes were directly attributable to this premium service. To what extent did federal and state regulators acknowledge this cost attribution and reflect it in telephone rate design?

a. Federal Allocation Approaches

In general, the method regulators use to distribute the costs of common use local exchange plant has failed to recognize the design effects of premium services on costs. Since 1947 the costs associated with the toll use of the common exchange plant have been allocated to the interstate and intrastate "jurisdictions" according to a "Separations Manual." The Manual has been sponsored by the Federal Communications Commission (FCC), which has authority over interstate toll services, and by the National Association of Regulatory Utility Commissioners (NARUC), a trade association of state regulatory commissions.

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[4] The prevailing method allocated costs according to "dial equipment minutes of use" (DEM). Local calls accounted for 90 percent of DEM.

TABLE II-3

NUMBER OF CENTRAL OFFICES BY TYPE OF SWITCHBOARD, TELEPHONES SERVED AND INVESTMENT BELL SYSTEM CARRIERS: 1948 and 1959

	1948		1959	
Type of Switchboard	Central Offices	Lines Served	Central Offices	Lines Served
Magneto-Manual	1,372	499,840	71	26,894
C.B.Manual	2,362	9,477,804	835	2,422,912
Auto-Manual	1	7,536	-	-
Dial-Automatic	4,272	21,373,282	-	-
Step-by-Step Dial	-	-	7,455	29,664,904
Cross-Bar Dial	-	-	2,107	20,476,457
Panel Dial	-	-	516	7,117,092
Other Dial	-	-	3	577
Totals	8,007	31,358,468	10,987	59,708,836
Central Office Equipment Investment (Millions)	$2,654.00		$7,249.00	
Investment Per Line	$84.63		$ 121.41	

Sources: "Statistics of Communications Industry," Table 25, Federal Communications Commission, December, 1948; "Statistics of Communication Common Carriers," Table 15, Federal Communications Commission, 1959.

While the Separations Manual has been identified as a "cost" manual and professes to pay allegiance to cost causation, the fundamental principle underlying the procedures is the "actual use basis which gives consideration to relative occupancy and relative time measurements" (47CFR, 1989). That is, the Separations Manual allocates common costs to services according to the use they make of common plant.

However, this cost allocation methodology is not appropriate for the allocation of costs in telecommunications (Gabel, R., 1967). For example, the local loop, furnished each telephone subscriber, is completely insensitive to the volume of usage traveling over it. That is to say, the investment in the loop is independent of the quantity of usage originated and received by the subscriber. If usage has no cost impact, then it cannot serve as a rational basis for cost allocation. Yet, relative usage of the separate service classifications has been the basis for apportioning this common plant investment to the separate jurisdictions. The result of using this inappropriate allocation method has been to ignore the changes and modifications to loop design arising from the superior operating requirements of the premium services.

Relative usage has been the method of apportioning jointly used local exchange plant between state and interstate which has prevailed since the first telephone separations plan was introduced in 1946. Under the relative use criterion for apportionment of local loop (distribution) facilities, the relative minutes of interstate toll usage as against the total state and interstate minutes of use was the basis of assignment of common exchange facilities to interstate toll operations.

There is some evidence that the differential toll costs were recognized in 1951 with the adoption of the "Charleston" method of telephone plant separations (Gabel, R., 1967). However, the magnitude of cost transfer to the message toll services to reflect these causative factors was relatively minor. Virtually all local telephone plant is used in common in the rendition of multiple telephone services: state message toll service, interstate message toll service as well as local service.

The Charleston Plan (1951) modified the relative usage measure by introducing a weight of two to the interstate toll minutes of use when deriving the interstate share of local loop costs. The introduction of the weighing factor was explained as acknowledgment of "the greater costs imposed on the network by long distance service." The principle of weighing toll dial minutes of use has continued in separations practice through the Ozark Plan, which survived through 1986.

> The toll dial equipment minutes of use applicable to each office are weighted to reflect the difference in average cost per toll minute of use as compared to the average cost per exchange minute of use (NARUC, 1951).

It is doubtful that the shifts in exchange costs with the Charleston Plan can primarily be attributed to recognition by regulators of toll costs, including the Numbering Plan, imposed

on common exchange plant. Controversy at that time revolved about the issue of toll rate disparities (NARUC, 1951). The differential between state message toll rates and interstate message toll rates was extremely large at short lengths of haul (NARUC, 1951, 173). It was political pressure over the disparity issue, exerted in the first instance through the chairman of the Senate Interstate Commerce Committee, that brought Charleston into effect (Gabel, D., 1967).

Introduction of automatic message accounting was one of the few instances where the federal and state regulators recognized the introduction of an investment as necessary for the premium service. Telephone "separations" procedures are intended to distribute common plant costs between the federal and state jurisdictions.

AMA equipment was set up as a separate plant category for allocation to interstate and intrastate operations. Although the principal of cost causality in the allocation of automatic message accounting equipment was recognized, implementation nevertheless resulted in an unfair burden on local ratepayers.

AMA was classified as Category 4, Central Office Equipment. Investment in AMA plant was allocated to the respective state and federal jurisdictions on the ratios of relative messages. However, most large urban communities employed the same equipment for recording and billing of local message unit calls. Message unit calls require only one or two line entries on the perforator and recorder equipment, while toll calls require five line entries. So, on the basis of relative usage, the cost allocation result was biased against the local exchange service.

b. State Approaches

The FCC-NARUC Separations Manual provides a standard governing the cost allocation to interstate message toll service. However, similar rules do not exist for the cost allocation of intrastate message toll service. Examination of state message toll costs by the state regulators is a rarity. Generally, state commissions who regulate this segment of the telephone business set state toll schedules on a "value" basis without reference to toll costs. The meaning of the value-of-service concept in establishing intrastate message charges has varied over time.

Until divestiture in 1984, a major consideration had been minimizing the disparity between state toll rates and interstate toll rates for comparable lengths of haul. The great differences in the composition of toll traffic at the separate jurisdictions ensured significant differences in the level of costs, however.

* Interstate toll trunk groups generally have higher density, -- that is a proportionately larger volume of traffic than intrastate toll trunk groups.

* Unit costs are generally lower for the larger trunk groups. Interstate message toll

has longer lengths of haul than intrastate toll. A large part of interexchange circuit costs are in the terminations. Hence, spreading these termination costs over longer distances generally results in lower costs per message mile for the interstate service (NARUC, 1951).

Where the state toll rates do not cover state toll costs, the telephone company is ensured of recovering all its costs, including return, by the method of residual rate making. Under residual rate making, the dominant state utility ratemaking method for intrastate toll service, tariff schedules are first adopted for all non-basic services (e.g., message toll, private line, custom calling, etc.).

The difference between the aggregate revenue requirements of the utility and the estimated revenues to be generated by these non-basic services became the basis for determining basic exchange rates. The result of residual ratemaking has been to allocate a significant percentage of message toll, private line, and customer calling costs to basic local service customers. Value of service allocation methods have resulted in a subsidization of premium services, just as have allocation methods based on usage.

What role did the impact of premium costs play in the rate designs adopted by the state regulatory commissions? After reviewing virtually all the state commission decisions bearing on telephone rates over the years 1949-1959, the answer is almost none. For example, the Charleston separations plan had reduced intrastate plant allocation by $90 million and intrastate expenses by about $23 million. Every state benefitted to some extent by this relief in state revenue requirements.

Net earnings of several major carriers showed immediate improvement. No state commission, except Indiana which ordered a $4 million rate reduction, attempted any local exchange or state message toll rate reduction during this period (Telecommunications Reports, 1952a and 1952b).

Very few state commissions undertook an examination of the costs of the separated service categories, for example, local exchange, state message toll service (MTS). Rather, the rate design of the intrastate service classifications was based upon "value of service" considerations. The effect of the growth and changes in the nationwide numbering plan were brought on by toll message requirements, not only the interstate MTS, but state message toll as well. These are identifiable and significant costs which should be attributed to the toll services. The author's review of the state commission decisions during this period shows

almost no State PUCs recognized this.[5]

C. Price Trends

Against this recounting of the costs imposed on local exchange plant by the demands of long distance service, it is surprising to find that the common view of many economists is that rates prescribed for premium services, especially message toll, subsidize rates for local exchange service (Temin and Peters, 1986 and Temin and Peters, 1985). Not only does the design analysis contradict this view, but so too does analysis of rate changes over the period.

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[5] Notwithstanding the dramatic reductions in toll prices over the years, economists generally still contend that the toll service classifications "subsidize" basic local exchange service. It is important to understand the reasoning which underlies this conclusion (MacAvoy and Robinson, 1983; Kahn, 1984; and Brock, 1986).

While there are many explanations, the "incremental cost" argument and the "efficiency" argument are the dominant views of these economists. McAvoy and Robinson, for example, observe that between 1964 and 1977 the average charge for local service increased by two-thirds, while the "direct costs associated with that service tripled." During the same period prices for interstate long distance service remained nearly constant "while direct costs fell by more than two-thirds." Nowhere do the authors seek to define the composition of these direct costs. All of the fixed common plant costs (loop, station wiring, protector and block) were considered as direct costs of local exchange service.

The so-called "toll subsidy" turns out to be a function of the telephone company definition of costs. The incremental cost of long distance service includes only the traffic sensitive cost of long distance, carefully omitting any assignment of the fixed, common plant costs. If one accepts the argument that all fixed plant costs should be assigned to local service and none to long distance, then one has "proved" by circular reasoning, not cost analysis, that local exchange service was being subsidized by message toll.

A second argument is used to justify the allocation of fixed subscriber plant costs to basic exchange rates in order to prop up the subsidy claim.

"Because subscriber plant costs do not vary in the amount of usage, it is inefficient to charge callers on the basis of usage... Since the marginal costs of using the local loop are zero, the price should also be zero...prices set above marginal costs are not desirable in terms of economic efficiency" (CBO, 1984).

This argument has some merit. Unfortunately for the author, it applies to all services not just toll calls. Subscriber plant costs do not vary with usage by non-toll either. They are also zero. As discussed earlier, usage is not a legitimate basis on which to allocate costs.

In 1925, a coast-to-coast message daytime toll call of three minute duration cost $16.50, and "on a typical long-distance call one could usually hear about two percent of the sound level that left the speaker's lips." (Mabon, 1975, viii) The comparable charge for a customer-dialed daytime call made in 1989 for a three-minute call was $.75 (FCC, 1989 and FCC, 1991). In 1925 the average monthly charge for one-party residential telephone service was about $3.60 (Mabon, 1975). At the end of 1989 the average monthly residential rate was $17.54 (FCC, 1990c).[6]

Thus, we see that interstate message toll rates have come down about twenty-two fold over this 65 year period, while basic local exchange rates have increased nearly five-fold during this same time period. The reduction in charges for long distance rates has been attributable only in part to the enormous improvements in interexchange technology that occurred over this time period.

Consistent data is available for the period of conversion from Manual to Direct Distance Dialing. Expensive technical changes to implement DDD were of the utmost important in driving costs in the industry during the years 1949-1960. It is interesting to compare the prices paid for local service and toll services (see Table II-4). The price of basic local service rose by 27 percent between 1949 and 1960, while interstate toll increased by 6 percent and state toll by 13 percent. If toll rates were "subsidizing" local exchange service, generosity was not too encompassing.

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[6] In 1925 most toll traffic was carried over open wire lines or the most elementary forms of FM carrier systems. Today, toll transmission is via coaxial cable, satellites and high density forms of microwave radio relay and optical fiber. In recognition of the more profitable opportunities available through expansion of its long distance service, the AT&T Company concentrated its research and development effort on improving interexchange facilities. Nevertheless, to accommodate the new toll technologies, corresponding changes were necessary in the end links, the common use local exchange plant.

TABLE II-4

HISTORICAL PRICE TRENDS: 1949-1960
(Price Indices)

	LOCAL SERVICE	LONG DISTANCE SERVICE	
		INTERSTATE	INTRASTATE
1949	118.64	76.44	114.93
1951	127.30	76.43	117.22
1953	138.66	83.40	122.52
1955	142.06	83.38	124.89
1957	146.92	83.35	124.19
1959	150.41	81.41	127.99
1960	150.91	81.27	129.43

Source: AT&T unpublished price indices. Local rates based on 95 major cities.

D. Appendix

1. Modification of switching equipment

About half the Bell System local central offices were upgraded to dial in 1948. There were three dominant forms of dial switching at that time: Step-by-Step, Panel, and No.1 Crossbar. Both the Panel and Crossbar switching systems are referred to as common control. A common control office receives address pulses from subscribers, stores the digits momentarily, determines the routing and routes the call accordingly. The a.c. signaling systems were rapidly adopted by the common control elements of the local crossbar and panel switching system through modification of the registers and senders of these entities.[7]

[7] A register is the first unit of common equipment in a central office. It receives address information, either as dial pulses or as multifrequency signals and stores it momentarily for conversion or translation. The sender receives address information from the

However, the greatest number of local offices at the time were the Step-by-Step central offices. The selector switches in Step offices could not be controlled by these a.c. pulses. In order to accommodate the Step-by-Step central offices to a.c. signaling, many offices were "senderized." Senderization involved the addition of devices to the step switch matrix to add a common control function. This modification permitted Step offices to receive address information, store it momentarily and then outpulse correct routing digits to a trunk or to the local equipment. Senderization was an expensive plant addition, undertaken solely for toll service, but there is no evidence that any part of these plant additions were attributed exclusively to the toll service classification.

Many Step-by-Step central offices were not senderized and therefore were not capable of performing the equivalent call processing function that the register-sender units performed in common control central offices. Implementing DDD in these local offices required them to be arranged to reach points outside of their home numbering plan area. It was costly to expand the selector stages to select and to send the dialed area code to a toll center. For this reason, in these systems, a toll access code, "112," was initially introduced so that these calls would be directed toward a toll recording office. The routing, timing and ticketing function was then completed at the toll office.

Also, dial switching modifications were required of the Panel and No.1 Crossbar local offices. Extensive modification was required of the subscriber senders of these systems in order to handle DDD calls. For example, auxiliary senders were devised to provide extra digit capacity and the ability to handle multifrequency (M.F.) outpulsing.[8] The auxiliary sender received all digits in excess of the eight that the regular sender could register. These were extremely expensive modifications that were undertaken solely to accommodate the local switching network to DDD.

2. Uniform telephone numbering plan

Most long distance calling after World War II was performed through manual toll

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register or routing information from a translator and outpulses correct routing information to a trunk or to local equipment.

[8] The jurisdictional cost treatment of auxiliary senders confirms the general rule that state regulatory authorities gave scant recognition to causative factors when identifying telephone costs. Auxiliary senders were separately identified and classified as Category 5, Other Toll Dialing Central Office Equipment. This investment, in turn, was distributed on the basis of toll minutes of use. Except for the California P.U.C., where three-way cost studies were undertaken, and cost allocation generally followed the FCC Separations Manual, no other state appears to have recognized the character of this plant. This means that the state residual portion of auxiliary sender investment was distributed to basic exchange service on the dominant "value" pricing concept (Bell Telephone Laboratories, 1982).

switchboards. The first step in preparation for DDD, was operator toll dialing. The success of operator toll dialing meant that once automatic charge recording was accomplished, customers could dial their own calls directly.

The entire United States and Canada, certain Caribbean islands, and parts of Mexico have been divided geographically into Numbering Plan Areas (NPA) and assigned NPA codes commonly referred to as area codes. In addition, a few NPA codes have been assigned for special purpose and are known as Special Area Codes (SACs). Special area codes are dedicated for miscellaneous purposes such as customer instruction (411), calling announcement services (911), etc. These special purposes include inward WATS service, TWX service, and mass calling arrangements such as telethons and elections, which have now gravitated to "900-type" services.

Boundaries were initially established for the NPA codes to last for long periods of time and their locations were based on estimates of future requirements. Like many other forecasts, much better boundaries could have been drawn. Making changes in these boundaries has caused and will cause massive customer disruption and very expensive plant rearrangements.

The North American Numbering Plan (NANP) requires the following structure for a 10-digit number: N 0/1 N NNX XXXX, where X represents any digit from 0 through 9, N represents only those digits in the series 2 through 9, and 0/1 stands for the zero (0) or the unit (1) digit. If a subscriber is permitted to dial both 7-digit and 10-digit numbers, the switching equipment can distinguish between the two by examining the second digit dialed. By precluding the use of the zero and unit digits in the second digit of the central office code, the switch is made aware that a local exchange number is being dialed.

The advent of DDD required several other plant changes in the central office equipment. First, the auxiliary senders in common control offices (Crossbar, Panel) were modified from 7-digit to 10-digit capacity. The sender is a device in a common control switching system which receives address information and pulses out the correct routing digits to a trunk or to the local equipment. The intelligence imparted by the sender switch had to conform to the expanded switch matrix brought on by DDD.

Other ancillary changes were made as a result of the introduction and subsequent alteration of the NANP. This program got under way in the sixties. Common control switching such as Crossbar and Electronic offices contain special translation and code conversion features. These either pass forward digits pulsed by the customer or delete the area code and/or the office code to replace it with another, depending upon the trunking, tandem switching or alternative routing arrangement. The Number 5 Crossbar machines were modified to equip the registers, senders and connectors with sufficient capacity to cope with changes to the 3-digit area code and/or to a 7-digit directory number. The pretranslators were equipped so as to indicate to the originating registers how many digits to expect.

Since there were no longer manual switchboard operators to time and ticket toll calls, automatic message accounting (AMA) had been introduced to record the traffic. Each change to record additional area code digits required a corresponding change in the AMA equipment. These are costs which have been largely borne by local exchange ratepayers but are incurred in response to the technical operating requirements of message toll service.

Additional costs were incurred for equipment necessary to dial the additional digits. This additional equipment varied by the vintage and type of equipment. For Step-by-Step central offices, initial stages were frequently equipped with digit absorbing selector switches. When the initial digits were dialed, the selector equipment would merely absorb the digits, drop back in place, but pass on no further signal information.

Far more extensive and expensive modifications were required for the Panel and No.1 Crossbar local offices. The subscriber senders of these systems received the dial pulses and, in turn, outpulse modified routing digits to a trunk or internally to the local equipment. While the additional investment for digit absorbing selectors was recognized as a distinct toll investment, subscriber senders were classified as part of the general switch matrix despite their expensive modification.[9]

[9] The bulk of local dial Central Office Equipment was classified as Category 6, Central Office Equipment and distributed on the ratio of dial equipment minutes of use (traffic sensitive). Since about 90 percent of dial equipment usage is for local exchange service, this classification received a disproportionate assignment of the investment in subscriber sender plant. The originating registers, senders and markers in a No. 1 Crossbar office are equipped with five relays for recording each digit of the dialed number. For the handling of DDD calls, these equipment items are equipped with eleven sets of relays in place of four necessary for purely local calls (AT&T, 1961).

III. THE INTELLIGENT NETWORK: ISDN AND SS7

A. Background: From Analog Voice to Digital Data

With the exception of the low income population, the public service objective of universal service was virtually achieved in the United States by the 1970s through the deployment of a universal network optimized for voice telephone service. This telecommunication network is dominated by analog switching and transmission. This is because analog forms of signal representation are voice-based and the predominant form of transmission has been voice service.

At the same time, traditional signaling has been "in-band" where signal information shares the voice channel. In-band signaling uses not only the same physical path as the call it serves, it also uses the same frequency band as the voice signals that are carried. Because the control signals have the same electromagnetic properties as the voice signals, they can go anywhere that the voice signals go.

Today, however, the industry is gravitating to a variety of information services for business and, to a lesser extent, for social activities.[1] To provide these services, the telephone industry is evolving into what has been termed an intelligent network (IN), optimized for the economic transport of all forms of information transmitted in digital form.

As with the previous changes discussed in this paper, a number of changes are being made in the network to achieve this new type of service. Data and voice networks are being integrated, transmission and switching are migrating to digital forms, signaling is shifting to out of band, and numbering is evolving yet again. Needless to say, all of the changes have significant cost implications for local exchange plant.

B. Integrated Services Digital Network

1. Network organization

Although the analog network provides satisfactory service for POTS, it is less than satisfactory for many information/data services. Therefore, the telephone, telegraph and video networks have been largely separate entities. Development of data networks has remained separate to a considerable degree.

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[1] Information Service has been defined by Judge Harold Greene of the Federal District Court as "the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing or making available information which may be conveyed via telecommunications, except that such service does not include any use of such capability for the management, control of operation of a telecommunication system or the management of a telecommunication service" (United States v. AT&T, 1982).

For example, in the 1970s, digital transmission, via T-1 carrier and digital switching, was introduced separately into the telephone network (essentially a network within the network). At the same time, many private data networks were established using leased communication lines and serving mainly large business organizations. More recently, public dedicated data networks, based either on circuit switching or packet switching have been established to provide non-voice communications for the business community. Thus, networks optimized for the more recent services, such as data transmission, have stood beside a network optimized for voice services.

The Integrated Services Digital Network (ISDN) has evolved as a means of combining conventional voice grade services with non-voice services. The same digital switches and digital routes would be the common path for all services. The ISDN seeks to consolidate the separate networks for voice, telex, audio, data, video, etc., into a single multipurpose network. An ISDN must have many capabilities to be able to handle the different services and performance characteristics of its component service classifications. The network must have the ability to:

* Handle voice, audio, interactive and bulk data, facsimile, compressed video, full motion video and conventional voice.

* Efficiently transport both continuous traffic (e.g., bulk data, compressed video, full motion video) and conventional voice.

* Allocate bandwidth on a demand basis.

* Allow fast call establishment and termination.

* Handle a wide range of transmission speeds and call holding times.

* Guarantee low bit error rates, low end-to-end message delay and low message nondelivery rates.

* Provide various levels of communication security.

While all of the Regional Bell Operating Companies have introduced trial ISDN installations, these have operated as virtual islands in the absence of interconnection. The challenge of integrating information age services into the existing network has generated ambitious plans to evolve the telephone network and operations architecture.

The essential facilities that will still be used as part of the telecommunication system that supplies almost all services remains the local exchange facilities. Just as in earlier decades, when the integration of local exchange and toll service, and the modification of message toll service to Direct Distance Dialing required major network transformation, the move to the intelligent network is being accompanied by vast changes in local exchange architecture and

design which causes very large increases in expenditures.

2. Technical problems and design considerations

a. ISDN Transmission and Switching in the Intelligent Network

The starting point for understanding the push to transform the network must be in an analysis of the demands that data and other premium uses place on the network and the limitations of the existing analog network, which was designed and built for voice uses.

The operating needs of data traffic frequently differ significantly from conversational voice calls. Tables III-1 and III-2 identify several key differences, as well as the types of services that require higher levels of system performance. ISDN, with its digital technology, is designed to overcome these limitations of analog service in order to accommodate the technical and operating requirements for the premium information, data and video services.[2]

A large proportion of data traffic is "bursty," extending for very short duration in comparison with a typical voice conversation. Because the time a circuit is engaged in the passage of information is so much shorter for data calls, the need for shorter call setup periods is more critical. For voice calls this period varies from three to twenty seconds, depending upon equipment. On a public switched data network, call setup time is usually less than one second.

A similar disparity in performance requirements applies to the bit rate or speed of service. For a voice call, a rate of 2.4 kbps (2,400 bits per second) will ensure satisfactory transmission performance. The ISDN objective, geared to medium- speed data traffic, has been set at 64 kbps.

An operating problem has also arisen with the use of conventional voice-grade loop facilities as they enter into the transmission of greater volumes of data traffic. Voice grade facilities have long been employed successfully as the medium for passage of slow-speed data signals (viz., 100 baud telegraph, 1200 baud data, and signal services). But as business has moved into successively higher speeds of transmission, the conventional voice bandwidth has proved to be a serious bottleneck: additional spectrum is required.

The need for additional spectrum has resulted in the redesign of loop facilities. In place of the conventional 3.5 khz facility, loops intended to transmit large quantities of high speed data are engineered for 64 khz capacity, nearly a twenty-fold increase in spectrum availability. While conventional voice-grade loops are normally 2-wire facilities, digital loops are 4-wire, thus making available separate paths for simultaneous transmission of

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[2] Sources relied upon in this chapter include (Stallings, 1989; Kessler, 1989; Kraemer and Martin, 1988; and Dorros, 1987).

TABLE III-1

PERFORMANCE COMPARISONS OF VOICE NETWORK IN RELATION TO NON-VOICE SERVICE CATEGORIES AND REQUIREMENTS

Parameter	Public Switched Analog Telephone Network	Public Switched Digital Network	ISDN Objective (Digital)
Call Duration (seconds)	120	CCT: 10 - 3600 Packet: .001 - 1	Variable
Call Setup Time (seconds)	3 - 20	CCT: .1 - 1 Packet: 1 - 10	1 - 3
Information Transfer Time (seconds)	10	CCT: .001 Packet: .1 - 1	10
Error Rate (errors/million)	1000	CCT: 1 Packet: 100	1
Bit Rate (kilobits/second)	2.4	Up to 48	> 64

• Circuit switched

Sources: Electrical Communications, Vol. 56, No.1, 1981, p.6.

TABLE III-2

Business Service Requirements Furnished by ISDN

Service	Bandwidth (kbps)
Telephone	8, 16, 32 or 64
Interactive Data Communication:	4.8 - 64
Electronic Mail:	4.8 - 64
Bulk Data Transfer:	4.8 - 64
Facsimile:	4.8 - 64
Slow Scan TV:	56 - 64
Videoconferencing:	1,544

Sources: ISDN Concepts, Facilities and Services, G.C. Kessler, Table 3.2.

outgoing and incoming signals. Again it is speed and volume of transmission that make the conventional 2-wire analog loop inadequate (see Appendix for more detail).

b. Signaling

It will be recalled that a prime reason for going digital and having recourse to ISDN is speed and volume of information transfer. Analog signaling which is in-band is quite limited for information transfer. With in-band signaling, the channel is only available for control signals when there are no voice signals on the circuit. With out-of-band signaling, a very narrow bandwidth is available. To take advantage of the potential services and to cope with the increasing complexity of evolving network technology, a more powerful control signal response is needed.

With in-band signaling, the amount of delay is considerable from the time a subscriber enters an address (dials a number) and connection is established. With the new types of data

and information traffic (e.g., transaction processing) with relatively short holding times per message (viz., three seconds), this call setup time represents an appreciable part of the total transaction time.

Out-of-band signaling addresses these limitations of in-band signaling. By carrying control signals over paths completely independent of voice channels, significant reductions in call setup time can be achieved.

As noted earlier, Signaling System 7 is designed to serve as the signaling mechanism for ISDN. As one industry publication put it, "Coast-to-coast ISDN is only possible with deployment of intelligent network capabilities such as out-of-band signaling" (Telephony, 1990, 9). Out-of-band signaling takes advantage of the fact that voice signals do not use the full 4 khz bandwidth allotted to them. A separate narrow signaling band is used to send control signals. Thus, control signals can be sent whether or not voice signals are on the line, thus allowing continuous supervision and control of a call. (See Appendix for more detail)

c. Numbering

As recently as 1970, industry experts conjectured that the then existent North American Numbering Plan (NANP) would survive for 75 to 100 years without alteration (USTA, 1971). The Nationwide Numbering Plan was initially designed to accommodate changes and growth in the subscriber population. The growth in requirements for telephone numbers in earlier years arose out of enlargement of the normal subscriber population. This growth was systematic and relatively slow (ranging between 1.5 and 2.0 percent annually).

During the last decade, however, the Numbering Plan Area (NPA) codes in at least ten states have exhausted the supply of 3-digit central office codes of the form "NNX." The new growth in demand for telephone numbers has arisen from the addition of new, premium services that require telephone numbers. These new services include ISDN, cellular, paging, gateway functions, services using open network architecture (ONA) and services using multiple numbers assigned to common terminal equipment (e.g., Centrex) (USTA, 1989b). These are among the most rapidly growing services in the telecommunications industry. Their demand for telephone numbers will continue to place a major requirement for greater quantities of telephone numbers.

An impending shortage of NPA codes is forcing modifications to the existing telephone numbering scheme. The existing 10-digit telephone number length is being maintained, but the quantity of valid digit combinations is being increased.

The interchangeable code approach is being used to modify the existing format of both central office codes and NPA codes. A date no later than July 1995 has been chosen as the estimated deadline for the conversion of all offices to interchangeable NPA code capability. By that date, all telephone switching equipment in North America should be capable of

recognizing and accepting a new NPA format. Because of format restriction, NPA codes are limited, however, and further changes will be necessary.

The conversion to interchangeable area codes will provide a fourfold increase in the number of area codes (Bellcore, 1986). Unlike the interchangeable central office codes which can be implemented on an area basis, interchangeable NPA codes will have to be implemented simultaneously throughout the North American dial network. Every switching system using the NANP will have to be converted to accept the additional NNX format as NPA codes. (See Appendix for more detail).

C. Cost Impacts and the Allocation of the Cost Burden

1. Advantages and disadvantages of the Intelligent Network

Will users face higher or lower costs with the implementation of ISDN and SS7? These costs will be a function of technology, depreciation policy, functional allocation of the total costs between the network and customer terminal equipment (which partially assume a network functional role) and the policies dictating the rate of return and distribution of revenue requirement between service categories. Because so many of the variables establishing future cost levels are indeterminate at the present time, any record of cost and cost incidence is subject to considerable error. Nevertheless, it is certain that the absolute level of expenditures will be very great and this advance in technology cannot be justified on the basis of cost savings.

The complex mix of enhanced capabilities for existing premium services and new services makes analysis of the net economic effects of the intelligent network complex. However, the net effect is clearly negative. The intelligent network will cost a great deal more.

There are at least five distinct advantages which may be recognized with ISDN.

1. There may be some overall cost savings as multiple networks are consolidated into a single multipurpose network. Space, real estate and other resource savings may arise with this economy of scope. But these saving may not materialize until well into the next century. The transition to ISDN will be slow. In the interim the telephone companies will operate both analog and digital facilities. Whatever economies of scope that may exist will likely occur once the older plant has been completely phased out.

2. The Intelligent Network (IN) allows information to be located in a centralized data base, rather than in each exchange throughout the network as it is now. From the viewpoint of the telephone companies, the greatest attraction of the IN is its ability to reduce the development cycle for new services from years to months (Gilhooly, 1987 and Loosen, 1988). It can take up to four years to equip each exchange with the

software upgrades needed for a new service. The IN aims to avoid this software bottleneck. By having the software centralized in a few locations (viz., the SS7 service point), it will be possible to make new services available throughout the local access transport area (LATA) simply by changing the software at this location. If demand for particular services is sufficiently large, then the intelligence can be distributed to the point of need, i.e., to local exchanges.[3]

3. Cost savings may be realized in systems electronics, maintenance and labor costs. Fewer amplifiers or repeaters are needed with digital facilities and the reported incidence of digital trouble faults is lower than on analog facilities.

4. The industry claims that with a single, consolidated service there will be savings in planning and other costs as well as increased flexibility. Separate networks entail separate facilities together with their respective spare, idle plant. In theory, more effective utilization of bandwidth should be achieved with rendition of multiple services on the common use loop and switch. But conversely, if the new resources are not utilized as forecast in the ISDN projections, costs may increase.

5. In addition to bringing about ISDN connectivity, the introduction of SS7 will permit local exchange carriers to offer new premium services, often called CLASS services. Custom Local Area Signaling Service (CLASS) offerings will be available on a multi-location basis as SS7 spreads. CLASS services are generally based on the use of calling number identification.

Examination of these initial features indicates that many are inherited services from previous telephone company offerings. (e.g., automatic call distribution, toll restriction, etc.). The novel facets arise with the capability of recording and transforming calling number identification. The services are oriented to business markets and, in some instances, to usage by affluent residential households. No benefits to normal POTS users can be discerned. POTS customers will receive few service benefits from the development of digital facilities.

A leading researcher for the National Regulatory Research Institute has commented:

"...there is no direct and widely accepted evidence that POTS monopoly single line residential and business customers will need, use or benefit from these enhanced and more costly services" (Lawton, 1988, 9).

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[3] Judge Harold Greene's interpretation of the interexchange provision of the line of business restrictions would require the BOCs to locate SS7 terminations in every LATA. Consequently, these savings from the delivery of software-defined service changes to many LATAs from one central SS7 location may not actually materialize.

Even Bellcore, the research arm of the local Bell companies recognizes the problem:

> "State Commissions are sensitive to 'gold plating', e.g., overbuilding under the guise of ISDN deployment of special loop conditioning that may be required for ISDN. As with any new technology the LECs (local exchange carriers) pass implementation costs to subscribers. However, in the case of ISDN, state regulators fear that LECs will subsidize general network upgrades for ISDN to retain large business customers that might otherwise leave the public network for other alternatives, e.g., advanced private line or other private networks. Since residential users receive little benefit in the near term from ISDN, state regulators are likely to monitor ISDN costs to ensure that the residential ratepayers is not overly burdened with this." (underlining supplied) (Bellcore, 1982).

The disadvantages of the combined network would include at least the following:

1. Beginning about 1962 the industry undertook replacement of its inter-office analog facilities with digital trunks. The economy of the "T-1" PCM digital carrier is generally not challenged. However, the relative economy of total digitization is widely debated. For example, Rolf Wigand, a leading international telecommunications specialist has estimated that the combined cost of the advanced network "will run into hundreds of billions of dollars" and questions whether benefits will equate with the expected costs (Wigand, 1988).

2. Implementation of ISDN technology will require users to replace the existing network with a network that, while it is more sophisticated, may be considerably more expensive. The increased aggregate cost is due to the fact that the intelligent functions have not been explicitly demanded and basic exchange ratepayers may not need to utilize them (Marks, 1984). This problem is also related to functional allocation between the network and customer premises equipment, as well as the cost of "intelligence." With the advent of market competition in the provision of customer terminal equipment, manufacturers have incorporated numerous service features in the software of PBX's and Key Systems. Large commercial firms have increasingly relied on house staff and in-house communication capabilities. It is these same firms to whom the telephone companies look as their primary users of sophisticated vertical services. If these firms rely instead, on in-house services, expected revenues may not materialize for the telephone companies.

3. Although the telephone companies, as well as the manufacturers, continue to predict cheaper digital facilities in the future, whatever savings are ultimately realized will only take place when all equipment is digitized. Although ISDN presupposes implementation of end-to-end, all digital networks in the final stage, in the interim, coders or connectors will have to be maintained between analog and digital facilities. These interface devices are expensive and also impose operating penalties throughout the network.

4. While it is relatively inexpensive to replace trunk lines, it is expensive to replace local loops which connect this local exchange to customer premises. While all early versions of ISDN claimed the intent of using the present loop as much as possible, operating experience indicates that substantial replacement will be required.[4]

5. It is five years since Basic Rate Interface (2B+D) was first installed in local exchange networks. Those networks are still unable to transfer 64 kbps calls to interexchange networks, in part because their new signaling systems do not fully interoperate. Primary Rate Interface (23B+D) services are available from interexchange carriers, but are not generally offered by the local telephone companies. Basic Rate Interface services are available from the local telephone companies, but not from interexchange carriers.

6. As discussed previously, the effect of the heavy replacement of analog facilities with digital technologies, will be to substantially increase costs in the short run. As new investment is brought in while the existing plant is not fully depreciated, ratepayers will bear the cost of write-off of both old and new facilities. No one has successfully demonstrated that the cost increase due to accelerated depreciation will be offset by cost decreases due to more efficient, multipurpose technology.

Given these large costs, it is clear that savings in other costs cannot justify these technologies. These technologies raise the cost of providing service. Only increased revenue can hope to make them a net economic benefits to the overall network. As one analyst recently put it,

> "If the deployment of ISDN is to be justified in economic terms, it will be done on the basis of revenue enhancement, not cost reduction. For the service provider, ISDN is not about costs, it is about revenue...the LECs need new applications to drive revenue generation" (Finnie, 1989, 67).

Future revenues cannot be credibly projected, however. Independent analysts have predicted that voice communications will continue to generate the greatest portion of ISDN traffic. The vast majority of uses will benefit little, but they will bear the costs.

> "...it does not pay to build a network to the highest requirement which for eighty to ninety percent of the time will be used for the lowest requirement." (de Hass, 1982, 39).

2. The magnitude of costs

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[4] Removal of load coils and bridging points is only a small part of the cost difficulties encountered in order to accommodate the passage of high speed data (Data Communications, 1988).

Both ISDN and SS7 have been technologies which have engaged the interest of industry participants for a number of years. It may be useful to cite the observations made by a number of these experts with respect to probable cost levels.

Estimates of ISDN investment per access line range from $3,500 to $10,000 depending upon the effect of the many variables noted previously. These amounts compare with the year end 1989 investment of the seven RBOCs of approximately $1,800 per access line which largely exclude ISDN and SS7 (FCC, 1989).

The local switching plant of the industry was designed and built to furnish voice-grade telephone services. As observed in prior discussion, this analog switching is seriously deficient in accommodating the requirements of the data/information market. All of the carriers have gradually abandoned hundreds of millions of dollars of electromechanical switching systems and are currently replacing their analog ESS machines with digital central office equipment. An interesting indicator of the likely cost of switching center upgrade is reflected in accelerated depreciation charges.

In addition to the cost of deploying the new technology, the cost of taking out the old technology has been a source of concern. Accelerated retirement of analog central office equipment was followed by a precipitous increase in annual depreciation rates (FCC, 1980 and FCC, 1989). Between 1980 and 1989 annual depreciation charges of the seven Regional Bell Operating Companies increased from $7 billion to $13.6 billion. This increased expense includes all depreciable accounts.

A separate estimate was prepared for the central office equipment accounts. As calculated in Table III-2, the annual increase in depreciation charges for the years 1980-1988 attributable solely to the higher annual depreciation rates applicable solely to central office equipment was in excess of $2 billion. Other industry sources have published estimates of the various costs associated with introduction of ISDN and SS7:

> "It will cost $2 billion to replace existing analog switches with digital" (Deere, 1988, 50).

> " The cost of designing and building such advanced networks (SDN) will run into hundreds of billions of dollars..." (Wigand, 1988).

Similarly, the cost of the changeout in numbering will vary within each Numbering Plan area and will vary somewhat depending on the types of switching equipment located in each area, but it will also be considerable. As the American Telephone Company observed several years ago when contemplating the proposed code format changes: "...the total cost will be very large" (AT&T, 1981, 6).

> "To implement these changes, millions of dollars will be spent on hardware, software and public notification throughout North America by all local exchange carriers (LECs)"

(Epstein, 1990, 60).

"The economic impact of the international traffic changes may be considerable" (USTA, 1989a, 2).

The Illinois Bell Telephone Company recently estimated the cost of the changeover in its Chicago NPA. Chicago has a high proportion of digital and analog electronic central office equipment. The cost of such changes are naturally lower for electronic equipment because only software modifications are required, compared to the older electromechanical central office equipment which will require hardware changes.

For Chicago, "the cost of technically preparing for the new code, including labor, is expected to reach $15 million. But... that does not include mailings, public relations efforts and business packages designed to smooth out the transition" (Telephony, 1989, 11). Extrapolating the Chicago cost experience to the balance of the Numbering Plan Areas indicates a nationwide cost would be in the neighborhood of $2.3 billion. Including the overhead costs, it is reasonable to expect the combined nationwide cost will exceed $3 billion.

3. Incidence of the cost burden

To date, little or no recognition has been made of the causative nature of the higher depreciation costs. In general, they have been distributed indiscriminately among all service categories with no attempt at assignment on the basis of cost causation. This has meant that the basic exchange ratepayer who has benefitted least from the changeover of plant facilities has borne the heaviest cost burden.

For example, the mainstay of ISDN basic rate architecture is the use of 64 kilobit channels. This standard is highly desirous in accommodating the passage of high speed data services. But this is clearly an overbuild for voice services which still constitute the majority of the common network usage. We know that transmission of voice at 32, 16 and even 9.6 kilobits will provide highly acceptable service quality (Felts, 1982).

A similar conclusion is in order with respect to the costs of numbering changes. We have previously observed that the growth of basic subscriber demand does not threaten the integrity of the Nationwide Numbering Plan. It is fair to say that the costs imposed by these

TABLE III-3

ANNUAL INCREASE IN DEPRECIATION CHARGES FOR CENTRAL OFFICE EQUIPMENT, REGIONAL BELL OPERATING COMPANIES: 1980-1988

Plant Account	Estimated Investment 1/80[a] ($000)	Annual Depreciation[b] Rates			Increased Depreciation Expense ($000)
		1980 %	1988 %	Increase %	
Step-by-Step	5,412,092	17.0	22.8	5.8	313,901
Crossbar	11,973,119	15.7	20.9	5.2	622,602
Analog ESS	12,849,939	5.5	11.2	5.7	732,447
Circuit Equipment	12,958,693	6.2	9.8	3.6	466,513
Totals	$43,193,843				$2,135,463

a) Central office equipment investment of BOCs as of 1/1/80 of $43,195,644,000 distributed to sub-accounts after deducting circuit equipment estimated at 30 percent and panel @ $1.8 million excluded. The balance distributed to Step 17.9 percent, Crossbar - 39.6 percent, Analog ESS-42.5 percent on the ratio of stations.

b) Annual depreciation rates are an estimated average of the prescribed COE depreciation rates for the principal Bell carriers in 1980 and 1988.

Source: "Statistics of Communications," 1980, s 8, 12, Federal Communications Commission; "Files of Depreciation Branch," Common Carrier Bureau, Federal Communications Commission.

services on the Nationwide Numbering Plan, its modification and enlargement, are not reflected in a proportionate allocation of this cost burden to the causative service classifications. Again, it is the POTS classification which appears to bear the major cost assignment.[5]

The deployment of information age technologies not only raises questions about the misallocation of costs and benefits between service categories, but because the new technology is so dependent on creating new streams of revenues, it raises serious problems about the misallocation of costs and benefits across generations. One company's projections of costs and revenues in support of its request for increased rates to support the installation of out-of-band signaling is instructive (see TABLE III-4).

Although industry forecasts of revenues and expenses cannot be accepted at face value,[6] their own projections indicate that it would require four years of growth under company projections before the service would yield a positive return. It takes four years until the company anticipates revenues to exceed expenses in the metropolitan New York LATA. the investment does not break even until at least six years after the program is under way. Who will bear the onus of revenue deficiency in the intervening years?

D. Rate Regulation of Information Age Services

Experience has taught that it is essential that state regulators arrive at their own conclusions regarding the procedure for allocating costs associated with the ISDN-based advanced technological services. Both state and federal regulatory commissions have expressed real concern over the possible level of capital and recurring costs for ISDN and SS7. Hence an FCC Staff Inquiry was launched in February 1990 which sought an estimate by the RBOC carriers of the SS7 and ISDN investment and recurring expenses - defined as

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[5] The North American Numbering Plan (NANP) is administered by Bellcore, the R&D arm of the regional Bell companies. The leading expert of the NANP recently told an association gathering of state regulators: "It's not population growth but the growth in the number of new services that is exhausting the phone number supply" (State Telephone Regulation Report, 1990, 1). So there should be no dispute concerning the causative factor generating these additional costs. Since basic exchange service is clearly not the cost causative service category, it should be immunized from the cost effects. However, unless and until the regulators recognize the problem, under prevailing jurisdictional separations and rate design methods, it will be basic exchange ratepayers who will bear the bulk of these costs.

[6] The Company's projection of revenue is highly speculative. After nearly a decade of provisioning various Custom Calling Services (Speed Dialing, etc.), New York Telephone has still not reached the market development forecast for five years growth (New York Telephone, 1990).

TABLE III-4

NEW YORK TELEPHONE REVENUE, INVESTMENT AND EXPENSE
TO IMPLEMENT LOCAL COMMON CHANNEL SIGNALING ARCHITECTURE
METRO LATA
($ millions)

Year	Revenue	Investment	Expenses	Net Revenue
1990	0.0	24.1	12.2	- 36.3
1991	3.9	29.0	36.4	- 61.5
1992	19.2	30.6	64.0	- 75.4
1993	73.5	19.5	59.2	- 5.2
1994	22.6	- 7.9	22.6	7.9
1995	132.1	- 0.3	18.0	114.4
1996	158.9	- 2.6	11.4	150.1

Source: NY Tel Response by A.L. Culmone to CPB Info Request NO.132, Case No.90-C-0191.

"direct" - covering the years 1989-1992.[7] Some states have begun major reviews of telephone company modernization plans (New York, Tennessee).

1. Federal approaches

The conventional cost allocation measures adhered to by the FCC - subscriber line usage, relative minutes of use, etc. - rely upon an overly simplistic assumption of

[7] The inquiry launched by the staff of the Joint Conference on Open Network Architecture, Feb 23, 1990 sought to examine the investment and expenses associated with Public Packet Switched Networks (PPSN) as well as ISDN and SS7. The questions raised may have been directed to the jurisdictional impact of these costs. However, the data cited in the text refer to the RBOC estimates of aggregate direct costs, excluding common and overhead costs.

homogeneity of causation by all services.

Since 1984 the F.C.C. has made a serious effort to reverse this principle and, by indirection, to re-establish the Board-to-Board principle. Amendments to the Separations Manual, undertaken since 1984, eliminated the weighting factor in the allocation of the toll portion of traffic sensitive common exchange plant.

Although there is no economic justification for allocating fixed plant costs solely to basic exchange customers, doing so has had significant equity implications. The FCC and the industry agreed after June 1, 1986 that most local exchange plant facilities were non-traffic sensitive and accordingly, relieved the interexchange carriers from major responsibility for compensating the local exchange carriers for this cost. Instead, the FCC adopted the Subscriber Line Charge (SLC). As of April 1, 1989, single line residential customers pay $3.50 per month for the use of local plant in the rendition of interstate long distance toll service.

The imposition of the subscriber line charge has been largely responsible for the shift in distribution of local and long distance rates since the divestiture of the Bell System. Most toll traffic is generated by large commercial firms and affluent residential households. Approximately a fifth of households originate no message toll business. On the other hand, for reasons of public safety, health, and social needs, all households require local telephone service. The increase in local telephone rates has been disadvantageous to the elderly and to the poorer members of the community because they originate fewer long distance calls. At the same time, members of the business community and affluent residential households who generate a large number of toll calls have saved money.

> "Between 10 and 20 percent of all households place no long distance calls in a given 4 to 6 month period... Over two-thirds of households pay more in subscriber line charges than they saved as a result of the reduction in the rates for usage." (Cooper, 1987)

Of additional concern is the Joint Cost Order, which is intended to be the guide to separating the costs of basic and premium services. This order perpetuates the faulty allocation principles which are based on the quantity of use, rather than the quality of use. Common costs are allocated as if there was a common need for the recent round of expensive investment, when that is clearly not the case. Once again, the cost allocation formula misallocates costs to POTS customers.

The FCC, for example, has adopted a minute-of-use standard for allocating all access services in the provision of equal access for interexchange toll facilities. Under current jurisdictional separations procedures the investment in out-of-band signaling facilities is

apportioned on the basis of relative usage. Implementation is somewhat more complex.[8]

2. State Approaches

A number of state regulatory commissions have adopted this subscriber line charge and have levied intrastate SLC charges on local ratepayers to reduce the cost burden for intrastate message toll service (Mathios and Rogers, 1987). The effect of this shift in cost allocations has been detrimental to the majority of residential consumers.

The Regional Bell Operating Companies are seeking authority to change non-basic rates without a rate filing with the local Public Utility Commission. These efforts are proving increasingly successful in many states. Thus, it appears highly likely that by the time that these future Intelligent Network services are available and, in light of the competitive environment in which they largely fall, they will be "below the line." Clearly, current telephone ratepayers should not be required to fund expenditures for future subscriber services that will likely be outside regulatory commission scrutiny and which will return no revenues to the regulated side to pay for the investments financed by regulated customers.

The transition to Intelligent Network services poses problems of (1) investment timing and (2) mismatching of costs and benefits. The latter may occur if current ratepayers pay more than their fair share of the costs of ISDN, for example, if one class of ratepayers, e.g., POTS pays a share of costs greater than its share of benefits.

E. Price Trends

The great uncertainty in the magnitude of the costs that the Intelligent Network will impose and the uncertainty about regulatory decisions makes it extremely difficult to estimate what the price impact will be. The stakes are certain to be large, however.

An indicator of the impact can be found in the decision of the FCC to shift costs back to the local service level and industry efforts to obtain rate increases after divestiture. Between the break up of the telephone company in 1984 and 1990, local rates went up over 60 percent (see Table III-5). In dollar terms, the increase for local service nationwide was about $6.00

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[8] For example, Tandem switching equipment is apportioned on the basis of the relative number of study area minutes of use of this equipment. COE Category 3-Local Dial Switching, in study areas with more than 50,000 access lines, is apportioned on the relative dial equipment minutes of use (DEM). Wideband and exchange Trunk Facilities (CAT2) are apportioned between state and interstate on the basis of the relative minutes of use (MOU). Interexchange Cable and Wire Facilities - Category 3 Message is apportioned on the basis of conversation minute miles. While these principles appear simple, there are convoluted measures taken by the carriers to implement them. For a statement of the principles, see C.F.R., Part 67, Parts 123, 124, 125, 132, 143 and 138.

TABLE III-5

HISTORICAL PRICE TRENDS: 1982-1990
(Annual % Changes)

	Local Service	Long Distance Service	
		Interstate	Intrastate
1982	10.8	2.6	4.2
1983	3.3	1.5	7.4
1983	17.2	4.3	3.6
1985	8.9	-3.7	0.6
1986	7.1	-9.4	0.3
1987	3.3	-12.4	-3.0
1988	4.5	-4.2	-4.2
1989	0.6	-1.3	-2.6
1990	4.4	-2.9	-2.7

Source: "Trends in Telephone Service," Federal Communications Commission, Common Carrier Bureau, F.C.C., August 20, 1990.

per month. At the same time, interstate long distance rates declined about 33 percent, while intrastate long distance rates increased about 8 percent.

These changes can be used to put the cost of the information age in perspective. In Florida, it was estimated that deploying fiber optic cable on an accelerated basis would cost an average of $5.00 per month for several decades (Cooper, 1990). This does not include the cost of digital switches or SS7 technology. In Tennessee, it appears that deploying the latter two technologies will cost about $4.00 month (RCG, 1990).

F. Appendix

1. The new basic ISDN plant

Two primary types of service are currently available through ISDN. Basic service will provide two 64 kilobits per second (kbps) "B" channels and one 16 kbps "D" channel (2B & D) for a total of 144 kbps. The D channel is used to transmit network control information between the network user and the telephone company. For large business users, Primary service will be offered. Primary service will consist of 23 "B" channels of 64 kbps and one "D" channel of 64 kbps (23B & D) for a total of 1.544 megabits per second (mbps).

To understand why analog and digital network standards are so far apart, it is necessary to explain certain elementary properties of the separate service.

The human voice can produce tones in the frequency band of 50 to 15,000 hertz (hz) or 15 kilohertz (khz). The ear can hear sounds in the 60 to 20,000 hz passband. But the passband of the telephone local loop is roughly 300 to 3400 hz. How can a channel with a passband of 3.1 khz carry the information of a channel with a 14.95 khz bandwidth (15 khz-50 hz). The local loop is optimized for human voice and is not intended to carry just any analog signal. The major portion of the relative energy of the human voice signal is in the frequency range from about 200 to 3500 hz. Thus, the conventional loop design is adequate for quality human voice transmissions.

Now consider what happens when greater spectrum requirement is demanded for another service. Take the case of music, which is intended to be pleasing to a larger frequency spectrum of the ear. A transmission facility carrying music must use a larger bandwidth than voice. This is particularly important for the trunks connecting telephone switching offices. Filters and load coils in the network cut out the voice signals below 300 hz and above 3400 hz, even though the voice itself is capable of carrying much higher frequencies. Similarly, to pass high speed data signals a much greater passband is required.

A major stumbling block to sending digital signals between the central office and customer sites is today's local loop. The local loop comprises a twisted pair of 22 to 26 gauge unshielded copper wire. The average length of a local loop in the United States is about 18,000 feet.

Load coils are placed on the local loop to reduce the voice frequency attenuation (power loss) in the wire pair. While the load coils ensure that the voice signal is strong enough to travel the distance between the customer site and the central office, they effectively limit the voiceband to about 300 to 3400 Hertz. Data signals require the greater bandwidth for effective transmission. Bridged taps are also present on the local loop. They reduce installation time for new customer connections but they also adversely affect digital transmission on the loop. The problem with the analog local loop is that while 3.1 khz is sufficient for carrying analog human voice signals, it is not sufficient for carrying the

frequencies required to represent digital data.[9]

2. Signaling System 7

The local exchange network today is based on a single network technology. Both subscriber calls and the signaling and control information are transported on the same facilities and use the same switches.

Conventional signaling in voice networks tends to be designed for different types of transmission media in order to reduce signaling cost. The line plant in analog networks is usually two-wire unamplified audio and the line signaling is d.c. loop signaling. Local d.c. loop signaling has a limited range and some local d.c. signaling methods use ground return to increase the signaling limit. Low frequency a.c. may be adopted when the local d.c. signaling limit is exceeded. In both cases, all signals use the same transmission path over which the information is being relayed. Hence, the usual reference to "in-band" signaling.

In contrast, SS7 signaling utilizes a separate path, a facility independent of the path employed for information transmission. Thus, the reference to "out-of-band" signaling.

In the long-distance interexchange networks, in-band signaling technology has largely been replaced by two closely coupled networks -- the message transport network, and a separate interoffice (digital) data network that carries all signaling and network control data in a common channel. Separating the signaling, which is inherently digital, from the message traffic itself, results in faster call setups to accommodate the needs of data users; reduces the trunk requirements required for the same volume of busy-hour traffic; and of great importance to the telephone companies, has made possible the development of new services (Bellcore, 1990; Levine, 1989; Kessler, 1989; and Mitchell, 1990).

Local exchange carriers are in the process of introducing this technology into the local network using Signaling System No.7 (SS7) protocol. The initial benefits from the new technology are being realized for tandem-switched calls. But with additional equipment and software, this technology also provides the opportunity to make a wide variety of new services available. These services are produced by specialized computer processing software that is supplied either within the local exchange network or by enhanced service providers connected to it.

To understand the elements of the SS7 technology required for new premium services, it is helpful to follow the handling of an interoffice POTS call that passes through a common channel signaling network (SS7). Figure III-1 represents a simplified diagram to show the

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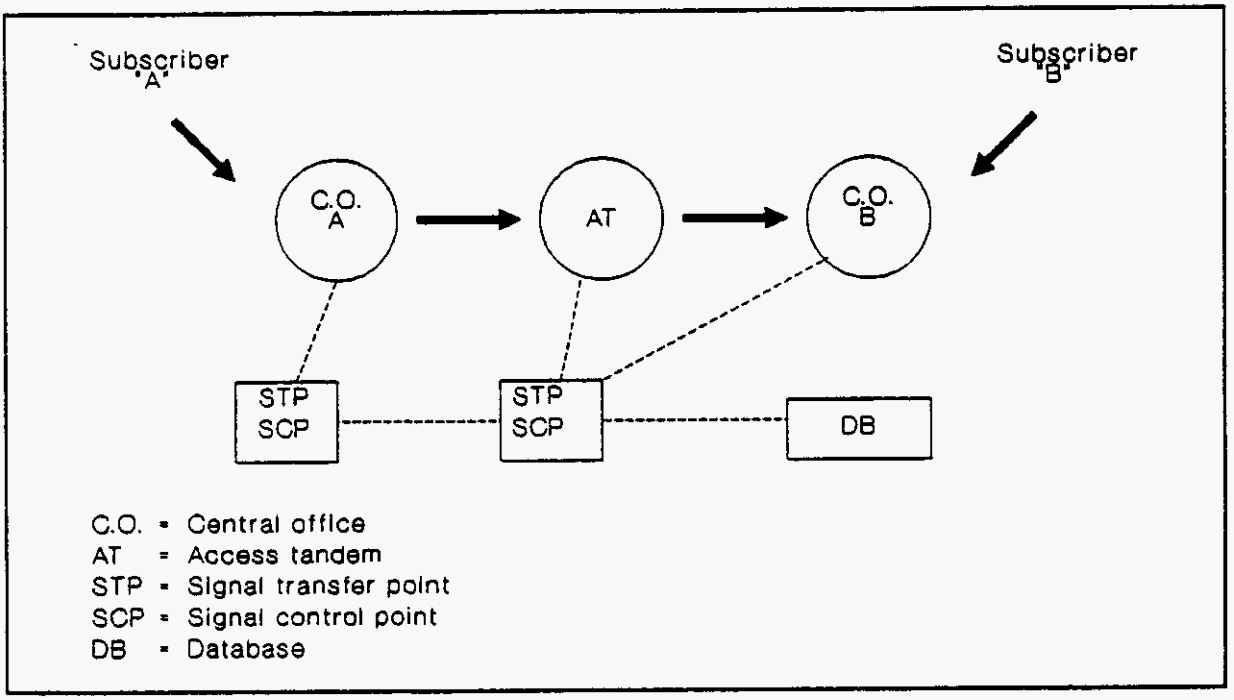
[9] It should be noted that some current local area network (LAN) products and standards use unshielded twisted pair at data rates up to 16 mbps. The length of the wire, however, is limited to a few hundred feet, well short of the local loop requirements of several miles.

FIGURE III-1

DIAGRAM OF SIGNALING SYSTEM 7



Source: Incremental Costs of Telephone Access and Local Use, Bridger Mitchell.

path of a call from subscriber A to subscriber B served in a different local office.

At A's central office, the local switch sends a data message containing both A's and B's telephone numbers over the data network, shown as dashed lines in Figure III-1. This message is passed through the signaling network to B's central office. There the switch determines whether B's line is busy. If it is, it returns a "line busy" data message. A's office receives the message and plays a busy-tone to caller A.

If the line is not busy, the switch in B's central office rings B's telephone. When B answers, the switch sends an "answered" data message back. Only then does the network establish a connection for the voice traffic between office A and office B, shown by solid lines. When the conversation is finished, the two switches send "hang-up" messages to the signaling network, which then removes the voice connection.

The common-channel network itself consists of 56 or 64 kbps digital links that connect the central office switches to special packet switches called signal transfer points (STPs).

Geographically separated STP's are linked in pairs (as spares) to ensure a high degree of reliability. Each has sufficient capacity to perform the task of the other, should one fail (Boatman, Larman, and Shabana, 1987).

In addition to providing capabilities for internal network control and administration, SS7 has two features that are of direct interest to end users: the Transaction Capabilities Part and the ISDN End Users Part. The Transaction Capabilities Part permits a telephone company switch to query a database (STP the Figure) for information on how a call should be handled; for example, how to route an IN-WATS (800 type) service call. The End User Part is intended to permit end-to-end transmission of information through the network, such as the identity of the called or calling number.

The last link in the User Part chain is the ISDN D-channel. It carries signaling information between customer premises equipment and a telephone company's switch. If a subscriber is not served by an ISDN switch, the information will not go beyond the telephone company's switch.

The BOCs began deployment of SS7 in 1987. The timetable for local SS7 availability will extend into the next century. "To equip the thousands of end offices operated by local carriers will involve a major reconfiguration effort and will be very expensive" (Levine, 1989).

3. Numbering

Because of format restrictions, NPA codes are limited to 152 and central office codes are limited to 640. The central office (CO) code digit format (NNX) has excluded combinations which make it look identical to the NPA (i.e., in the N 0/1 format). Interchangeable codes, however, are in the NXX format, permitting central office codes to have digits identical to the NPA. The change increases the number of available CO codes available in each NPA by 152, thus extending the life of the NPA.

With interchangeable NPA codes, every switch in the North American Numbering Plan will be required to accept the new format (NXX) for the NPA. When interchangeable CO codes are introduced, NPA and CO code formats will become indistinguishable. Therefore, a switch's ability to distinguish between 7-digit and 10-digit calls based on the first three digits dialed will be lost. Consequently, methods must be found to distinguish between them and route different call types. While three different methods for making this distinction have been recommended, the "Prefix Method" appears to be most likely to be adopted as the one with the least objectionable features.

In the prefix method, all 10-digit calls are prefixed with a "1" to indicate that 10 digits will follow. All 7-digit calls are dialed without a prefix. This means that even toll calls within the home numbering plans area will require the use of the prefix and 10-digit dialing. However, except for some crossbar equipment, which is being phased out of service, the

plan can be implemented with nearly all switching systems so that dialing consistency across the nationwide network can be achieved.

The CCITT (Consultive Committee for International Telegraph and Telephone), the international body responsible for developing service compatible solutions to common telephone problems across nations, has recommended that the capability to translate and route international telephone numbers will require up to fifteen digits in length. This does not include prefix digits such as "011" which are used throughout the world for international DDD access. The capability is required to be in place in all switches and networks by December 21, 1996.

This international technical standard will have enormous financial impact on the domestic network's screening and routing translations as well as billing systems. Most switching equipment in the United States today has been designed to perform routing for numbers up to ten to twelve digit lengths. Billing and accounting systems are also typically designed based on 10- to 12-digit length. These requirements are in addition to the need to implement interchangeable NPA/CO code capability caused by the exhaustion of current NPA codes within the North American Numbering Plan.

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ATTACHMENT MNC-8
TELEPHONE SERVICE AMONG HOUSEHOLDS ENROLLED
IN PUBLIC ASSISTANCE PROGRAMS IN FLORIDA

	HAVE TELEPHONE SERVICE (IN PERCENT)	
	YES	NO
FOOD STAMPS		
IN PROGRAM	77	23
NOT IN PROGRAM	95	5
MEDICAID		
IN PROGRAM	80	20
NOT IN PROGRAM	95	5
SSI		
IN PROGRAM	88	12
NOT IN PROGRAM	94	6
AFDC		
IN PROGRAM	69	31
NOT IN PROGRAM	94	6
ANY ASSISTANCE PROGRAM		
IN PROGRAM	80	20
NOT IN PROGRAM	95	5

SOURCE: Bureau of the Census, Current Population Survey: 1991.

ATTACHMENT MNC-9

ENROLLMENT IN ASSISTANCE PROGRAMS BY INCOME LEVEL

	ENROLLMENT IN PROGRAM (IN PERCENT)	
	YES	NO
INCOME RELATIVE TO POVERTY		
LT 50 PERCENT	47	53
50 TO LT .75	56	44
75 TO LT 100	45	56
100 TO LT 124	23	77
1.24 TO LT 2.00	10	90

SOURCE: Bureau of the Census, Current Population Survey: 1991.

ATTACHMENT MNC-10

DISTRIBUTION OF NON-SUBSCRIBERS BY ENROLLMENT AND INCOME LEVEL IN FLORIDA

	PERCENT OF ALL HOUSEHOLDS WITHOUT TELEPHONE SERVICE	PERCENT OF ALL HOUSEHOLDS
ENROLLED IN ASSISTANCE PROGRAM	34	11.5
NOT ENROLLED, INCOME LESS THAN 125 PERCENT OF POVERTY	19	10.5
NOT ENROLLED, INCOME BETWEEN 125 PERCENT AND 200 PERCENT OF POVERTY	22	14.9
NOT ENROLLED, INCOME ABOVE 200 PERCENT OF POVERTY	25	53.1

SOURCE: Bureau of the Census, Current Population Survey: 1991.

ATTACHMENT MNC-11

Utility Lifeline Programs: Prevalence and Performance (AARP Consumer Affairs and the Consumer Federation of America)

UTILITY LIFELINE PROGRAMS:

PREVALENCE AND PERFORMANCE

AARP

CONSUMER AFFAIRS

PROGRAMS DIVISION

IN

COOPERATION WITH

THE CONSUMER FEDERATION OF AMERICA

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EXECUTIVE SUMMARY

A. BACKGROUND

This report describes telephone, electricity and natural gas lifeline programs available in the U.S. as of early 1990. For the purposes of this report, lifeline programs are defined as programs that reduce the charges for utility services for specific groups of people. In the mid-1970s there were virtually no such programs; today, citizens of 48 states and 2 jurisdictions (the District of Columbia and Puerto Rico) have access to one or more of these programs (see Table ES-1).

ES-1: The Availability of Lifeline Programs (as of July 1990)

State	Lifeline	Linkup	Energy	State	Lifeline	Linkup	Energy
AL	No	Yes	Yes	MT	Yes	Yes	No
AK	No	No	No	NB	No	Yes	No
AZ	Yes	Yes	Yes	NV	Yes	Yes	No
AR	Yes	Yes	No	NH	No	Yes	No
CA	Yes	No	Yes	NJ	No	Yes	No
CO	Yes*	Yes*	No	NM	Yes	Yes	No
CT	No	Yes	No	NY	Yes	Yes	No
DE	No	No	No	NC	Yes	Yes	Yes
DC	Yes	Yes	Yes	ND	No	Yes	No
FL	No	Yes	Yes	OH	Yes	Yes	No
GA	No	Yes	Yes	OK	No	Yes	No
HI	Yes	Yes	No	OR	Yes	Yes	No
ID	Yes	Yes	No	PA	No	Yes	No
IL	No	Yes	No	RI	Yes	Yes	Yes
IN	No	Yes	No	SC	No	Yes	No
IA	No	Yes	No	SD	Yes	Yes	No
KS	No	Yes	No	TN	No	Yes	No
KY	No	Yes	No	TX	Yes	Yes	No
LA	Yes	Yes	No	UT	Yes	Yes	No
ME	Yes	Yes	No	VT	Yes	Yes	No
MD	Yes	Yes	No	VA	Yes	Yes	No
MA	Yes	Yes	Yes	WA	Yes	No	No
MI	Yes	Yes	Yes	WV	Yes	Yes	No
MN	Yes	Yes	No	WI	No	Yes	No
MS	No	Yes	No	WY	No	Yes	No
MO	Yes	Yes	No	PR	No	Yes	No

* Program terminated then reinstituted

Source: AARP/CFA Survey of state public utility commissions and analysis of FCC Form 496 data base.

The benefits dispensed exceed $100 million dollars per year. However, because these programs have not reached their entire target populations, they have not yet reached their full potential in providing benefits. If all eligible households were enrolled, the benefits could approach $500 million.

The report was compiled by first conducting a literature review to identify important concepts and program characteristics. Contact was made with every public utility commission in the country to solicit written material on existing lifeline programs. Trade associations were also contacted as were numerous federal agencies. The Federal Communications Commission's (FCC) data base on telephone Lifeline and Link Up programs was provided by that agency, as were copies of the individual filings submitted by the telephone companies and PUCs.

The report includes a brief description of programs available in all states and jurisdictions.

B. PROGRAM BENEFITS AND ELIGIBILITY

The FCC's Lifeline program involves the reduction (or elimination) of the federal subscriber line charge for enrolled households, matched by an equal reduction of local telephone charges. In virtually all jurisdictions where programs exist, the entire federal lifeline charge is waived and matched by an equal ($3.65) reduction in monthly charges.

The Link Up program involves reducing installation charges by half. Reductions of up to $30 on installation charges and the cost of amortizing the remaining installation charges over a 12 month period will be paid by the federal government.

Energy Lifeline programs offer either a fixed dollar amount credit or a percentage discount on monthly utility bills. The monthly discounts range from $3 to $7 per month. The discounts offered range from 2 to 30 percent.

The overwhelming majority of all assistance programs utilize enrollment in (or eligibility for) an existing, means tested assistance program as the criteria for eligibility for Lifeline or Link Up benefits.

For the Lifeline program, Supplemental Security Income (SSI) is the most frequently used for certification (9 of 36 states). Aid to Families with Dependent Children (AFDC) is the second most frequently used criteria (7 states). These are followed by food stamps and Medicaid (6 states), energy assistance programs and other low income programs come next (5 states).

The food stamp program is the most frequently applied criteria for Link Up (19 states), followed by SSI (18), AFDC (17), energy assistance (16) and Medicaid (13).

Link Up programs are much more liberal in the eligibility criteria. Over a quarter of the jurisdictions allow individuals enrolled in any one of the five major assistance programs -- SSI, AFDC, Food Stamps, Energy Assistance or Medicaid -- to enroll in the Link Up program. Over a third of all jurisdictions certify for Link Up with enrollment in one of three or more programs. This contrasts to one-eighteenth for Lifeline programs.

Energy Lifeline programs have fairly restrictive eligibility criteria. Two offer benefits only to those receiving SSI. Only one uses enrollment in any of five programs as proving eligibility. One has an age or an income criteria. Two have an age and an income criteria. (One of those also requires that the recipient be disabled.) In contrast, programs that use a percent of poverty cutoff set the cutoffs fairly high, ranging from 125 to 185 percent of poverty.

D. PARTICIPATION

Lifeline programs had identified approximately five million households as eligible. Another three states that initiated their programs in 1989 or early 1990 had an additional .6 million households eligible. These 5.6 million households represent approximately 10 percent of the households in those jurisdictions.

This relatively low percentage (low relative to the size of the population with incomes below 125 percent of poverty, for example) results from the interaction of two factors. First, there is less than 100 percent enrollment in the criteria programs. Second, the requirement of multiple criteria in some jurisdictions reduces the number of eligible households sharply.

In one sense the Link Up program appears larger. In total, the Link Up program eligible population is approximately nine million households in 47 states. Those households also represent approximately 10 percent of the total population in those jurisdictions.

In the Lifeline program, approximately one-third of the eligible households are enrolled in those programs that were in operation throughout 1989. The participation rate varies from less than ten percent in half a dozen states to over seventy percent in one state.

Link Up statistics are quite different. Only three percent of the eligible households are enrolled. However, this figure is quite misleading for a number of reasons.

First, Link Up is available only to those without telephones. Since approximately 80 percent of low income households had a telephone at the beginning of the year, the majority of households eligible by income standards were not in a status to apply for the program. Second, the Link Up program is considerably newer than the Lifeline program. Third, in the period covered by the data, the Link Up program imposed non-income related criteria -- a period of time without a phone at a particular residence.

Although there is data on participation in the above-mentioned program, unfortunately, there is no data with which to assess the participation in energy assistance programs.

E. ADMINISTRATIVE CHARACTERISTICS

In most cases, certification of eligibility is synonymous with enrollment in a specified program. Certification of eligibility ranges from self-certification, in which the respondent simply states that the household is eligible, to computerized matches of participation in programs that involve extensive case-work certification.

As participation rates have failed to develop as hoped for, more attention has been devoted to outreach. The most frequent approach is one dominated by telephone companies -- either service representatives or brochures (8 jurisdictions). A second combination is to rely on media -- radio and/or television (seven jurisdictions). Equally frequent is reliance on mailings (brochures and mailings). Seven states identify no outreach strategy. Print campaigns and inserts were identified by six jurisdictions each.

F. ADMINISTRATIVE COSTS

Administrative cost applies only to the costs associated with running the program and does not include the cost of benefits. A wide variation in costs is evident. Using the most frequent measure of cost, cost per enrollee, we find a low of approximately $.03 per month to a high of $.46 per month, with an average of $.25. A more appropriate measure of administrative cost may be cost per eligible household, since a significant portion of expenses are for outreach. Here we observe costs from less than one-third of a cent to $.25, with an average of $.09.

Finally, it should be noted that since eligible households are only a small portion of all subscribers, the cost per subscriber is quite small. Administrative costs per subscriber average less than $.01 per month.

G. ADMINISTRATIVE CHARACTERISTICS AND PROGRAM OUTCOMES

Many factors affect program outcomes. There are higher expenditures per eligible household the higher the percentage of eligible households who enroll. This is not the case for expenditures per enrollee.

Three administrative factors appear to affect participation rates -- targeting of programs to the elderly, use of written materials and individual certification of eligibility. Each of these factors independently, and in combination, has an impact. An attempt to capture this approach in relatively simple statistical terms by showing the three variables crosstabulated, is presented in Table ES-2.

ES-2: Crosstabulation of Factors Affecting Participation Rates

	Elderly Targeting			
	No		Yes	
	Individual Certification		Individual Certification	
	No	Yes	No	Yes
Radio/TV Only	.11 (n=2)	.30 (n=1)	.30 (n=2)	N/A
TV/Radio+Written	.14 (n=5)	N/A	N/A	N/A
Written/ No TV/Radio	.25 (n=9)	.43 (n=6)	.74 (n=1)	N/A

Source: AARP/CFA Analysis of FCC, Form 496 data base.

States that have two or more of these three traits, which are *not conducive to high participation rates*, have average rates in the range of .10. States with two or more traits conducive to higher participation rates have rates above .25. Those with elderly targeting and one other trait are above .50. Thus, we believe these three characteristics are quite important and deserve careful consideration in program design.

At the macro level, a case can be made that the programs have had an impact. The penetration rate among the poorest households, the vast majority of whom are likely to be eligible for telephone assistance benefits, rose sharply in 1989, after the Link-up program was put in place and when the Lifeline program achieved significant penetration. *In the national* average figures, gains in penetration rates were exhibited from 1984 forward. Moreover, although price increases were larger in the early years, there were national average price increases at the time that penetration rates were increasing among low income households.

I. INTRODUCTION

A. BACKGROUND

This report describes telephone, electricity and natural gas lifeline programs available in the U.S. as of early 1990.[1] For the programs of this report, lifeline programs are defined as programs that reduce the changes for utility services for specific groups of people.[2]

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[1] The basic survey of availability of programs was taken from National Association of Regulatory Utility Commissioners, NARUC Annual Report on Utility and Carrier Regulation 1988 (Washington, D.C.: October 30, 1989). Telephone lifeline availability was updated with Industry Analysis Division, Monitoring Report, CC Docket No. 87-339, Federal Communications Commission, July 1990.

Earlier surveys with more qualitative information can be found in National Association of Regulatory Utility Commissioners, Survey on State Lifeline Telephone Service, February 4, 1985; Office of the Consumers' Counsel, State of Ohio, Survey on Lifeline Telephone Service, July 28, 1986; National Conference of State Legislatures, Electric and Natural Gas Utilities: A Survey of State Legislation, 1982-1984; and Standish, Jean H., et. al, Trends Report of Energy Assistance Programs in the Fifty States, 1979-1984 (Columbus, Ohio: National Regulatory Research Institute, 1985).

[2] The initial debate over lifeline rates embodied a significant difference of opinion over the question of targeting. That is, some considered low charges for an initial "essential" level of service, available to all, to be a lifeline. Others insisted that lifeline rates must be targeted to specific groups of households with identified need. Untargeted lifelines were roundly criticized for delivering benefits to the wrong households because they were not targeted; but in the aggregate, they could also be defended. (For a sampling of this literature see Dahl, Albin J., "California Lifeline Policy," Public Utilities Fortnightly, August 31, 1978; Koger, Robert K., "Is There Economic Justification for a So-called Lifeline Rate?" Public Utilities Fortnightly, May 10, 1979; Sullivan, Timothy J., The Los Angeles Senior Citizen Lifeline Electricity Rate [Santa Monica, CA: The Rand Corporation, January 1979]; Roll, J. B. and Ellen Beth Lande, "Lifeline Rates, Impact and Significance," Public Utilities Fortnightly, July 31, 1980; Canan, Penelope and Michael Hennessey, "In Defense of Lifeline Rates: An Empirical

In the mid-1970s, on the heels of the first energy price shock and before the break-up of the telephone company, there were virtually no such programs.[1] Today, citizens of 48 states and two jurisdictions (the District of Columbia and Puerto Rico) have access to one or more of these programs (see Table I-1). The benefits dispensed exceed $100 million dollars per year.

However, because these programs have not reached their entire target populations, they have not yet reached their full potential in providing benefits.[2] If all eligible households

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Fortnightly, July 31, 1980; Canan, Penelope and Michael Hennessey, "In Defense of Lifeline Rates: An Empirical Analysis," Public Utilities Fortnightly, November 5, 1981; Petersen, H. Craig, "Gainers and Losers with Lifeline Electricity Rates," Public Utilities Fortnightly, November 25, 1982; Cullen, Bradley, T., et. al, "Implications of Electric Utility Rate Reform Legislation for Low Income Households in Oakland and Livingston Counties, Michigan," Social Sciences Journal, 20 (1983); Solano, Paul and William J. Sparling, "Energy Policy Options to Assist Needy Elderly Households," Marriage and Family Review, 9 (1985); Hennessey, Michael and Dennis Keane, "Lifeline Rates in California, Pricing Electricity to Achieve Social Goals," Evaluation Review, 13 (1989).

By the mid-1980s, the concept of targeting lifeline services had become dominant. For example, a General Accounting Office Study (Telephone Communications: Cost and Funding Information on Lifeline Telephone Services [Washington, D.C.: September 1987] p. 1), defined lifeline as follows:

> Lifeline telephone service is a local exchange service that has been specifically mandated by a legislative or regulatory body for the purpose of providing telephone service to low income households at reduced rates.

[1] For example, a standard bibliography service shows no explicit references to lifeline rates prior to 1975 (see White, Andrew G., "'Lifeline' Utility Rates: A Selected Bibliography," Public Administration Bibliography Series (Vance Bibliographies, December 1980).

[2] See Mark N. Cooper, Universal Telephone Service in Ohio: A Review of Recent Evidence (Ohio Consumers Counsel, November 12, 1987), pp. 12-16, for a discussion of participation in assistance programs frequently used as reference programs in telephone assistance programs. Census

were enrolled, the benefits could approach $500 million. Indeed, if these lifeline programs could only achieve the average penetration of more traditional assistance programs, such as food stamps and SSI, the distributed benefits would more than double.

Since these programs are invariably targeted at the low income, elderly and disabled populations, the failure to achieve a higher level of enrollment is a major concern. The elderly are particularly affected by a failure to achieve full participation, as low income older Americans are invariably eligible for these programs.

In light of the partial success of these programs in enrolling eligible households, there are two interconnected purposes of this report.

> The first purpose is to describe the nature of existing programs. This should familiarize local groups that serve eligible populations with the programs available in their areas, as well as the types of programs others have implemented.
>
> The report also seeks sufficient detail of description and complexity of analysis to arrive at judgments about what works and what does not in the implementation of lifeline programs. This should aid advocates and policy makers in implementing the changes necessary to achieve more effective programs.

---

data showed that approximately two-thirds of all households in Ohio with incomes below poverty levels were in one or more assistance programs. Participation in individual programs averaged about fifty percent.

Table I-1

The Availability of Lifeline Programs

State	Lifeline	Linkup	Energy	State	Lifeline	Linkup	Energy
AL	No	Yes	Yes	MT	Yes	Yes	No
AK	No	No	No	NB	No	Yes	No
AZ	Yes	Yes	Yes	NV	Yes	Yes	No
AR	Yes	Yes	No	NH	No	Yes	No
CA	Yes	No	Yes	NJ	No	Yes	No
CO	Yes*	Yes*	No	NM	Yes	Yes	No
CT	No	Yes	No	NY	Yes	Yes	No
DE	No	No	No	NC	Yes	Yes	Yes
DC	Yes	Yes	Yes	ND	No	Yes	No
FL	No	Yes	Yes	OH	Yes	Yes	No
GA	No	Yes	Yes	OK	No	Yes	No
HI	Yes	Yes	No	OR	Yes	Yes	No
ID	Yes	Yes	No	PA	No	Yes	No
IL	No	Yes	No	RI	Yes	Yes	Yes
IN	No	Yes	No	SC	No	Yes	No
IA	No	Yes	No	SD	Yes	Yes	No
KS	No	Yes	No	TN	No	Yes	No
KY	No	Yes	No	TX	Yes	Yes	No
LA	Yes	Yes	No	UT	Yes	Yes	No
ME	Yes	Yes	No	VT	Yes	Yes	No
MD	Yes	Yes	No	VA	Yes	Yes	No
MA	Yes	Yes	Yes	WA	Yes	No	No
MI	Yes	Yes	Yes	WV	Yes	Yes	No
MN	Yes	Yes	No	WI	No	Yes	No
MS	No	Yes	No	WY	No	Yes	No
MO	Yes	Yes	No	PR	No	Yes	No

* Program terminated then reinstituted

Source: AARP/CFA Survey of state public utility commissions and analysis of FCC Form 496 data base.

B. METHODOLOGY

The report was compiled by first conducting a literature review to identify important concepts and program characteristics. Past surveys and evaluations of lifeline programs were then consulted.

Contact was made with every public utility commission in the country to solicit written material on existing lifeline programs. Trade associations and numerous federal agencies were also contacted. The Federal Communications Commission's (FCC) data base on telephone Lifeline and Link Up programs was provided by that agency, as were copies of the individual filings submitted by the telephone companies and PUCs.[1]

Telephone assistance programs present the best opportunity to analyze the dynamics of utility-based lifeline programs because they are numerous, have been in existence for several years and have a federal information reporting requirement which generates reasonably complete and uniform data on program performance.

As indicated in Chapter II, there are two federal programs. The characteristics of these programs have been extensively debated in federal proceedings and will not be reviewed in great detail in this report. The focus of this report is an empirical description of the programs as they have been implemented, as well as an analysis of their impact and performance.

C. OUTLINE OF THE REPORT

The report is divided into five chapters.

Chapter II presents a broad definitional and conceptual discussion of the goals of lifeline programs.

Chapter III presents a description of the benefit levels generally available, the target population, and an analysis of the administrative characteristics of programs as implemented around the country, including certification, promotion and funding.

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[1] The underlying data was entered directly from the Form 496 information filed with the Commission. This was supplemented by a machine readable file provided by the Industry Analysis Division. This combined data set was then finalized based on the published report (FCC, op. cit.).

Chapter IV presents measures of outcomes, both in terms of benefits delivered and costs incurred. It includes an effort to ascertain which factors affect program performance.

Chapter V presents a short summary of the characteristics of individual programs in each of the states. Practitioners can easily identify what is available in their state and who is eligible. They can also identify patterns in other states for comparison.

II. THE GOALS OF UTILITY LIFELINE PROGRAMS

A. UTILITY RATEMAKING AND LIFELINE PROGRAMS

Because the programs analyzed in this study are utility-based lifeline programs, their origins are particularly important. Utility services are generally provided by privately owned companies with franchise monopolies whose rates are set subject to regulation.[1] The rates are usually administered by a public utility (service) commission (PUC).

In this institutional context, there is a lengthy and complex legal background for ratemaking. Companies must be given the opportunity to earn a return on their investment that is commensurate with the level of risk of the investment. Rates for customers must be just and reasonable and non-discriminatory. Lifeline rates -- defined as discounted rates for specific groups of customers -- raise a number of questions in this regard.

First, there may be questions about the legality of rates.[1] In a few states, lifeline rates have been ruled illegal because they violate the non-discrimination aspect of ratemaking.[2] In others, their status under general utility law is, or may have been, in doubt. In a number of those states, specific legislation has been enacted to ensure the legal underpinning of such rates. In still others, general PUC authority has been deemed sufficient to allow lifeline programs.

Second, since lifeline rates are usually amendments to existing rates, the question of loss of revenue by the utility comes up. Mechanisms for restoring the utility's opportunity to earn a fair rate of return are frequently the subject of intense debate. In short, a funding mechanism to compensate for discounts is important.

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[1] The standard text is Kahn, Alfred E., The Economics of Regulation: Principles and Institutions (Cambridge: MIT Press, 1988)

[1] NARUC, Survey..., Table I, shows ten states with a prohibition on lifelines. See also, Schnauer, P. "Lifeline Electric Rates: Are They Unreasonable Discriminatory?," Dickensen Law Review, 83 (1979).

[2] Two states clearly prohibit lifeline rates (North Dakota and Wyoming). In another dozen states the legality is uncertain, at least according to the NARUC Survey, Table 72.

The nature of the underlying authority can have an important impact on the nature of the program. Specific legislation is likely to prescribe the conditions of the program more precisely. For example, the Illinois telephone lifeline law imposes a cost-benefit test.[1] The program must provide a net benefit to the people of Illinois as a whole.

B. THE GOALS OF LIFELINE PROGRAMS

Most lifeline programs have one of two explicit goals: achieving universality of service or reducing the burden of purchasing services considered to be necessities. (The Illinois goal of ensuring a net benefit to the state is the exception as a goal for a lifeline program.)[2] A third goal frequently enters the debate: conservation and efficient use of resources.[3]

1. Universal Service

In telecommunications, universal service is a national goal adopted by the National Communications Act of 1934. The purposes of the Act included the following.

> For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all people of the United States a rapid, efficient, nation-wide and world-wide wire and radio communication service with adequate facilities at reasonable charges.[1]

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[1] Laws 1921, p. 702, S. 13-3-1, added by P.A. 84-1063, effective January 1, 1986. The commission is ordered to "participate in all federal programs intended to preserve or extend universal telecommunications service, unless such programs would place cost burdens on Illinois customers to telecommunications services in excess of the benefits they would receive through participation.

[2] Johnson, Leland, L., Telephone Assistance Programs for Low-Income Households: A Preliminary Assessment (Santa Monica, CA: The Rand Corporation, 1988), pp. 3-5, identifies these two goals.

[3] Conservation has been most prominent in the energy rate debate, (see Dahl, op. cit., Petersen, op. cit., Canan and Hennessey, op. cit.).

[1] Communications Act of 1934

Exactly what the language means has been the subject of some debate, but the decision of the Federal Communications Commission to institute lifeline programs was linked directly to this goal of the Communications Act.

> The preservation of universal service is a basic goal of this Commission. To further that goal, we adopted the recommendation of the CC Docket 80-286 Federal-State Joint Board to establish a federal assistance program, generally known as the Lifeline Assistance Program. That program helps low-income households stay on the network by providing matching assistance to subscribers receiving benefits under a qualifying state or local telephone company assistance plan. Qualifying subscribers are exempted from the monthly subscriber line charge when federal assistance is matched by the state benefits.
>
> Later we adopted further recommendations of that Joint Board to create a federal connection assistance program known as "Link to encourage low-income households to subscribe to local exchange service by reducing high connection charges.[1]

For energy utilities, the clearest expression of a universal service goal has been in efforts to prevent service terminations and to develop plans to maintain service to customers in arrears.[2] Again, federal policy played a role in stimulating debate. The Public Utility Regulatory Policies Act of 1978 included the following language.

> During any period when termination of service to an electric consumer would be especially dangerous to health, as determined by the state regulatory authority (with respect to an electric utility for which it has ratemaking authoritty) or nonregulated electric utility and such consumer establishes that:

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[1] Federal Communications Commission, Notice of Proposed Rulemaking, CC Docket No. 88-341, June 23, 1988, p.2.

[2] Eisenberg, Joel F., Meg Power and Jerry L. Pfeffer, "If the Poor Can't Pay..." Public Power, September-October 1983.

(A) He is unable to pay for such service in accordance with the requirements of the utility's billing, or

(B) He is able to pay for such service but only in installments, such service may not be terminated.

Special provisions shall be made to take into account the need to include reasonable provisions for elderly and handicapped consumers.[1]

2. **Reduced Burden**

Reducing the burden imposed on households tends to have a broader orientation. For energy utilities, the difference in goals is clear. Programs with a burden reduction goal do not focus on individuals in imminent danger of losing service. They offer benefits to all members of a target group.

Percentage of income programs deserve separate mention because they function on a unique basis that is explicitly burden reduction.[1] These programs target a specific percentage of income of the household as "reasonable" to pay and then shift the remaining revenue burden to others.

In telecommunications, the line between universal service and burden reduction has been somewhat blurred. Virtually all programs have been targeted widely, regardless of the bill status of the subscriber. The FCC's Link Up America program comes closest to a pure universal service program. It is targeted at people who are off the network and seeking to get back on. Link Up America provides assistance for installation charges (identified as a particular obstacle to obtaining service). The Lifeline program has no such targeting. It serves current or new customers.

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[1] Economic Regulatory Administration, Department of Energy, Voluntary Guidelines for Procedures for Termination of Electric Service and Gas Service Standards Under the Public Utility Regulatory Policies Act of 1978, Fed. Reg., 44:204, October 19, 1979, p. 60658.

[1] Brown, Ashley C., "Percentage of Income Payment Plans: Regulation Meets Social Reality," Public Utilities Fortnightly, March 19, 1987.

3. Conservation and Efficiency

Conservation and efficiency have entered the lifeline debate because most lifeline programs seek to change the price of the service to the customer, rather than transfer lump sums to beneficiaries. Since one of the goals of regulated pricing is to achieve economic efficiency, concerns are raised when lifeline rates come up. If people face a lower price, they may consume more, leading to inefficiency.

In telecommunications, the most direct expression of this concern has been efforts to tie lifeline benefits to measured service rates. The argument given is that measured service rates give better price signals.[1] Even if the general public is not forced to have measured service, the argument goes, those who are receiving highly discounted rates should be. This line of reasoning has been resisted because 1) the efficiency impact of lifeline rates in the current context of telecommunications pricing are unclear as a practical matter and 2) the distinction between flat rate and measured service as a measure of universal service is disputed.

In electricity and natural gas, efficiency has two aspects. One is similar to the telecommunications debate. Since building new plants costs more (electricity is a rising marginal cost industry) or finding new supplies of gas is more expensive than consuming current supplies, rates have been suggested which include rising costs per unit as consumption increases (inverted block rates). Even where average customers do not face such rates, inverted block rates have been advocated for lifeline customers.

The second way that efficiency and conservation enter the debate over lifeline services for energy utilities is through the question of consumption levels. The level of electricity and natural gas consumption is linked to the appliances and buildings that consumers possess. Older buildings were built with fewer measures to conserve energy. Similarly, the purchase price of less efficient equipment is lower -- although such equipment consumes more energy and may be more costly to operate on a life cycle cost basis. Lower income households are more likely to inhabit older residences and less likely to be able to afford the more expensive, more efficient appliances. Their housing and appliance stock is less efficient.

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[1] While this argument has been perceived as wisdom for quite some time, some of its most influential proponents have recently expressed strong doubts, see Park, Rolla Edward and Bridger M. Mitchell, Optimal Peak-load Pricing for Local Telephone Calls (Santa Monica, CA: The Rand Corporation, March 1987).

The net result is that low income households consume more energy per unit of comfort -- to heat or cool their homes, heat their water or cook their food -- than non-low income households. An obvious way to both lower their energy bills and conserve energy resources is to help them conserve by improving the efficiency of their residences and appliances.

Thus, conservation programs targeted at low income households enter the lifeline debate. However, conservation programs are not addressed in this paper.

III. CHARACTERISTICS OF LIFELINE PROGRAMS

The effort to achieve the goals of Lifeline programs is affected by two key characteristics. These are:

1. the level of benefits provided, and

2. the eligible population.

In addition, two key administrative issues affect the ability of programs to achieve their goals.

1. The responsibility for and frequency of certification.

2. The nature of outreach efforts.

A. BENEFITS

Flowing out of the debate over goals, although not always directly linked to it, we observe different patterns of benefits. It can be argued that reductions in the access price -- the price of obtaining a hook-up -- are oriented toward the universality goal. Such an approach can be justified on efficiency grounds as well. Reduced access prices are a reduction in fixed costs that do not vary with usage. Therefore, insofar as usage reflects variable costs and they are not lowered for lifeline customers, there is less of a unique efficiency impact of providing access assistance.

In telecommunications, the access component of price can be associated with both the installation charge and the monthly charge, in those cases where usage is provided on a measured basis. In electricity and natural gas, the equivalent to the monthly charge is the customer charge; there have been programs to reduce that. Hook-up charges are equivalent to installation charges, but we are unaware of programs to reduce these.

The possible variations on these basic themes are broad.

1. Telecommunications Programs

The FCC's Lifeline program involves the reduction (or elimination) of the federal subscriber line charge for enrolled households, matched by an equal reduction of local telephone charges. In virtually all jurisdictions where programs

exist[1] -- the entire federal lifeline charge is waived and matched by an equal ($3.65) reduction in monthly charges.

The Link Up program involves reducing installation charges by half. Reductions of up to $30 on installation charges and the cost of amortizing the remaining installation charges over a 12 month period will be paid by the FCC. A crucial distinction between the programs -- in addition to the fact that they are targeted at different parts of the telephone bill -- is that no local matching funds are required under the Link Up program.

A few states, like California and New York, have supplemented or gone beyond these programs. On the other hand, some states restrict the availability of benefits by insisting that subscribers enrolled in the program take a specific type of service -- such as local measured service.[2]

2. Energy Utility Programs

Energy lifeline programs offer either a fixed dollar amount credit or a percentage discount on monthly utility bills. The monthly discounts range from $3 to $7 per month. The discounts offered range from 10 to 30 percent (except for the 2.2 percent license tax waiver offered by the state of Alabama).

Since many of these programs entail percentage reductions, the size of the benefit will vary with the size of the bill. While we were unable to obtain many evaluations of the benefits received, those which were available give an idea of the range of the impact of the percentage discounts. In Arizona, the first year of an experimental program yielded customers benefits averaging $5 per month. In 1984 in Wisconsin, an experimental rate, which has since been eliminated, yielded $70 per month for gas customers and $75 per month for electric customers.

Some states offer low income customers protection against winter cutoffs if they abide by an agreed-upon payment schedule that spreads payments out over 12 months. Michigan also offers a program that spreads payments out.

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[1] There are actually 52 jurisdictions covered in this report, 50 states plus Puerto Rico and the District of Columbia. For ease of discussion, the word jurisdiction is used to apply to all.

[2] For example, California's program has a very simple income test, New York's program has a very low measured service rate in addition to flat rate service, while Arkansas requires measured service (where available) to participate in the lifeline program.

B. ELIGIBILITY

The goals of the programs are defined not only by the nature of the benefits they confer, but also, and perhaps more importantly, by the nature and size of the group declared eligible for the benefits. In general, a needy target population has been declared eligible. Eligibility requirements for utility-based programs have generally been driven by administrative concerns.

The FCC insisted on a means test in its Lifeline and Link Up programs to assure that assistance goes to those in need. Since means testing is a difficult process, most programs fall back on enrollment in some existing assistance program as a demonstration of need.

Thus, specific criteria regarding income, age and disability have been used frequently, with participation in targeted programs as the demonstration of eligibility.

1. Telecommunications Programs

The overwhelming majority of telephone assistance programs utilize enrollment in (or eligibility for) an existing, means tested assistance program as the criteria for eligibility for Lifeline or Link Up benefits (see Table III-1). Only three jurisdictions use a broad low income criteria, without specifying enrollment in another program.

Among the specific assistance programs, Supplemental Security Income (SSI) is most frequently used for certification in the Lifeline program (9 of 36 states). It is applied in just over one-third of the jurisdictions that have lifeline programs. Aid to Families with Dependent Children (AFDC) is the second most frequently used criteria (7 states or just over a quarter of jurisdictions with a lifeline program). These are followed by food stamps and Medicaid (6 states). Energy assistance programs and other low income programs come next (with just under one-quarter of all programs).

The food stamp program is the most frequently applied criteria for Link Up (19 states), followed by SSI (18), AFDC (17), energy assistance (16) and Medicaid (13).

Link Up programs are much more liberal in the eligibility criteria. Over a quarter of the jurisdictions allow individuals enrolled in any one of the five major assistance programs -- SSI, AFDC, Food Stamps, Energy Assistance or Medicaid -- to enroll in the Link Up program. One-eighteenth of the jurisdictions have a similar criteria for enrollment in Lifeline. Another eight

percent of the Link Up programs use enrollment in one of three major programs. None of the Lifeline programs uses enrollment in three major programs. Thus, over a third of all jurisdictions certify for Link Up with enrollment in one of three or more programs. This contrasts to one-eighteenth for Lifeline programs.

On the other end of the scale, 52 percent of the jurisdictions have no Lifeline program and 19 percent require multiple criteria for certification. The multiple criteria generally include an age stipulation (over 65) in addition to an income stipulation (low income, poor, or enrollment in an assistance program). For Link Up, 38 percent of the jurisdictions have no program and 6 percent have multiple criteria.

Clearly, the Link Up program has been defined more generously by the jurisdictions in terms of eligibility. The likely reason is that it requires no local matching funds (although administrative expenses are incurred).

The various combinations of criteria indicate that elderly low income households will be eligible in virtually all jurisdictions where a program exists. Even where the list of criteria programs is short, it tends to include a major assistance program oriented toward the elderly -- SSI, Medicare, etc. Finally, wherever something other than a general welfare program is included, the elderly are generally included in the multiple criteria.

2. Energy Utility Programs

Energy lifeline programs have fairly restrictive eligibility criteria. Two offer benefits only to those receiving SSI. Only one uses enrollment in any of five programs as proving eligibility. One has an age or an income criteria. Two have an age and an income criteria. (One of those also requires that the recipient be disabled.) In contrast, programs that use a percent of poverty cutoff set the cutoffs fairly high, ranging from 125 to 185 percent of poverty.

C. CERTIFICATION

As described above, most lifeline programs identify a needy population by reference to some pre-existing assistance program. In most cases, certification of eligibility is synonymous with enrollment in a specified program. Certification of eligibility ranges from self-certification, in which the respondent simply states that the household is eligible, to computerized matches of participation in programs that involve extensive case-work certification.

Table III-1

Eligibility Criteria

	Lifeline		Link-up	
Criteria	**Number**	**Percent**	**Number**	**Percent**
SSI	9	36	18	55
AFDC	7	28	17	52
Food Stamps	6	24	19	58
Medicaid	6	24	13	42
LIHEAP	5	20	16	49
Low Income	5	20	6	18
Elderly+Poor	5	20	1	3
Disabled+Poor	5	20	1	3
Elderly+LIHEAP	3	12	0	0
Combinations of Criteria				
Low Income	3	6	3	6
In any one of Major Programs				
4 or More	3	6	14	27
3	0	0	4	8
2	3	6	5	10
1	6	11	3	6
More than one Criteria	10	19	3	6
No Program	27	52	20	38

Source: AARP/CFA Analysis of FCC, Form 496 data base.

Since most programs utilize participation in some other means-tested program as a criteria for enrollment, verification can be done by computerized matching of names or involvement of public assistance agencies, presentation of enrollment documentation by the individual, or self-certification, with some form of verification. Generally, verification has been on an annual basis, although quarterly verification has been proposed in some states.

1. Telecommunications Programs

The predominant approach to certifying enrollment status is for individuals to declare eligibility with or without documentation. In most cases, there is then a verification either with the social service agency or through computer matches.

Based on an examination of the patterns, we identified four approaches to certification and verification. At one extreme, we find an approach that does not involve the individual in certification (other than perhaps requesting an agency to submit the necessary documentation). At the other extreme are cases in which no agency is involved. The individual certifies with documentation and no agency or computer check is made.

2. Energy Utility Programs

Certification for energy lifeline programs also ranges from automatic certification using a state-generated computer tape of eligible individuals, to certification by a state agency. Most programs call for self-certification, with or without supporting documentation. (In Arizona, the State Commission mandated that self-certification be used in pilot programs.) About half of the programs require annual recertification.

D. OUTREACH

Outreach efforts have become quite important and contentious. As penetration rates have failed to develop as hoped, more attention has been devoted to outreach. Approaches vary from television and radio announcements to involvement of telephone company and social service provider personnel, to brochures and bill inserts.

1. Telecommunications Programs

Approaches to outreach vary widely. Most programs utilize bill inserts and a majority use print media and social service agency promotions (see Table III-2). Brochures, mailings and telephone company representatives are used by about 40 percent of the programs. Other, less frequent, outreach efforts

involve radio and television, providers, and telephone company promotions (about 20 percent of the programs).

Most states use two to five forms of promotion. There are a number of combinations of outreach approaches.

The most frequent approach is one dominated by telephone companies -- either service representatives or brochures (8 jurisdictions). A second combination is to rely on media -- radio and/or television (seven jurisdictions). Equally frequent is reliance on mailings. Seven states identify no outreach strategy. Print campaigns and inserts were identified by six jurisdictions.

2. Energy Utility Programs

By and large, outreach efforts in energy utility programs parallel those in telecommunications. Since the states which have both telephone and energy programs are generally more vigorous in these programs, outreach efforts tend to be considerable.

E. CONCLUSION

Perhaps the clearest observation that can be offered in light of the above analysis is that the presence of the FCC link-up program, with its incentive for state participation and its reporting requirement, generates a great deal more information about programs. Systematic information on energy assistance programs at the state level is extremely rare and difficult to obtain.

A second observation is that there is a great deal of diversity in approaches to these programs. Even in the federal program, where a federal benefit is provided, states were left largely to their own devices to define their programs. Virtually every program is uniquely defined in terms of the three major administrative functions discussed in this chapter -- eligibility, certification and outreach.

Table III-2

Outreach Activities

Individual Activities		Number of States
1	Inserts	21
2	Press	14
3	Print	12
4	Social Service Agencies	12
5	Mailings	8
6	Brochures	8
7	Telco Reps Discuss	8
8	Radio	6
9	Providers	5
10	Client Services	5
11	Telco Brochures	5
12	Television	4
13	Speakers	3

General Combinations of Activities		
Telco	(7, 11)	8
Media	(3, 8, 12)	7
No Outreach		7
Mail	(3, 5, 6)	7
Print	(3, 5, 1)	6
Inserts	(1, 4)	6
Providers		2
Other		3

Source: AARP/CFA Analysis of FCC, Form 496 data base.

IV. EVALUATION OF LIFELINE PROGRAMS

The previous chapter outlined the characteristics of lifeline programs. This chapter reviews the results that programs have achieved in terms of participation and cost and attempts to ascertain which program characteristics are associated with better outcomes.

A. EVALUATIONS

Evaluation of the programs has been sketchy. Two different foci have been in evidence -- concern with the impact on ratepayers and program effectiveness. Program effectiveness measures have been much more common in the telecommunications area, primarily because of the FCC's initiative in requiring state matching funds.

> The FCC's reporting requirement presents a data base for evaluation and the FCC presents an annual report to Congress.[1] That report is basically descriptive of the magnitude of the program.
>
> A few states have conducted evaluation that seek to identify the causes of certain program outcomes -- such as participation rates or cost per enrollee.[1]
>
> A few studies have been conducted by researchers not affiliated with governmental entities or telephone companies.[2]

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[1] FCC, Annual Report, op. cit.

[1] Main, Idaho, and Vermont produce annual reports that evaluate issues such as penetration rates and cost per subscriber. These reports are available for the 1989 reporting year. Southwestern Bell has expended considerable effort to evaluate the programs on a periodic basis (see Makarewicz, Thomas, J., The Effectiveness of Low-Income Telephone Assistance Programs: Southwestern Bell's Experience, May 10, 1990), although administrative costs were not analyzed. Other states have also engaged in periodic analyses (see, for example, Booth, David, The Oregon Telephone Assistance Program: Interim Report Public Utility Commission of Oregon, Salem, April 9, 1987.

[2] Jonson, op. cit.

Energy programs have been examined most frequently in the context of reviewing the impact of rate structures on various categories of ratepayers. Program performance was rarely the focal point of concern. Many of these studies can be found in the academic.[3]

Unfortunately, the dearth of data on energy utility programs precludes an evaluation of these programs. This chapter will provide an evaluation of lifeline program outcomes on a cross state basis.

B. ELIGIBILITY AND PARTICIPATION

Twenty-nine jurisdictions had lifeline programs as of early 1990 (see Table IV-1). Twenty-six of the jurisdictions had lifeline programs in operation throughout 1989. These programs had identified approximately five million households as eligible. Another three states, which initiated their programs in 1989 or early 1990, had an additional .6 million households eligible. These 5.6 million households represent approximately 10 percent of the households in those jurisdictions. Unfortunately, there is no data available to estimate the coverage of energy lifeline programs.

This relatively low percentage (low relative to the size of the population with incomes below 125 percent of poverty, for example) results from the interaction of two factors. First, there is less than 100 percent enrollment in the criteria programs. Second, the requirement of multiple criteria in some jurisdictions sharply reduces the number of eligible households.

In one sense, the Link Up program appears larger. In total, the Link Up program eligible population is approximately nine million households in 47 states. Those households also represent approximately 10 percent of the total population in those jurisdictions.

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[3] See Hennesy and Keane, op. cit., for a recent example.

Table IV-1

Eligibility and Participation in Telephone Assistance Plans

State	Lifeline		Linkup		State	Lifeline		Linkup	
	Eligible (000)	Percent Enrolled	Eligible (000)	Percent Enrolled		Eligible (000)	Percent Enrolled	Eligible (000)	Percent Enrolled
AL			446	2.3	MT	91	5.9	91	2.3
AZ	41	30.3	376	1.6	NB			1	56.1
AR	74	8.5	342	3.2	NV	24	19.8	86	.0
CA	1881	62.7			NH			40	.9
CO	50*	N/A	208	N/A	NJ			39	4.4
CT			158	3.5	NM	35	33.5	216	1.1
DE					NY	1100	23.7	1100	8.7
DC	55	6.8	55	2.9	NC	189	8.2	270	1.8
FL			25	22.8	ND	26*		63*	1.1
GA			*		OH	120	10.0	120	8.4
HI	20	32.9	60*	.1	OK			*	
ID	11	73.5	79*	7.0	OR	85	23.5	41	4.6
IL			*		PA			744	4.6
IN			63*	2.0	RI	46	30.4	46	1.9
IA			14	44.6	SC			385	2.3
KS			3	49.8	SD	9	53.8	75	1.4
KY			438	.4	TN			442*	1.8
LA			560	2.0	TX	124	12.4	180	7.9
ME	69	49.5	29	26.9	UT	40	33.7	94	1.4
MD	74	3.9	241	.2	VT	36	47.9	36*	N/A
MA	419*		419*	.6	VA	48	32.1	525	.9
MI	615*	7.4	615*	1.4	WA	194	17.2		
MN	134	35.1	187	.9	WV	44	13.8	12	18.1
MS			267	.9	WI			*	
MO	25	58.8	101	1.9	WY			18*	2.9
					PR				
					US	5687	31.9	9412	3.1

*Early 1990 adoption of program.

Source: FCC, Annual Report, Tables 2.4 and 2.5.

In the Lifeline program, approximately one-third of the eligible households are enrolled in those programs which were in operation throughout 1989. The participation rate varies from less than 10 percent in half a dozen states to over 70 percent in one state.

Link-up statistics are quite different. Only 3 percent of the eligible households are enrolled. However, this figure is quite misleading for a number of reasons.

First, Link Up is available only to those without telephones. Since approximately 80 percent of low income households had a telephone at the beginning of the year, and a relatively small percentage were likely to terminate service over the course of the year, the majority of households eligible by income standards were not in a status to apply for the program. In all likelihood, only between a fifth and a quarter of those eligible by income were also eligible by telephone status. With this in mind, the participation rate would be in the range of 12 to 15 percent.

Second, the Link Up program is considerably newer than the Lifeline program. About one-quarter of the jurisdictions instituted their programs in 1989 or later. Therefore, the participation statistic reflects less than a full year of program effort.

Third, in the period covered by the data, the Link Up program imposed non-income related criteria -- a period of time without a phone at a particular residence. This would have further reduced the number of households actually eligible.

C. ADMINISTRATIVE COSTS

Participation is the most frequent measure of program outcome, but a second measure of program performance that is frequently considered is administrative cost. Administrative cost applies only to the costs associated with running the program and does not include the cost of benefits. The data here is sketchy even within the FCC reporting system because states report non-comparable costs. Table IV-2 shows the estimated administrative costs for eleven programs that appear to be well documented.

Table IV-2

Administrative Costs

State	Penetration	Monthly Cost per Enrolled Household	Monthly Cost per Eligible Household
NC	8.2%	$.104	$.003
HI	32.9	.029	.010
MD	3.9	.458	.018
NY	23.7	.092	.022
NV	19.8	.158	.032
RI	30.4	.175	.053
MO	58.8	.175	.102
AZ	29.9	.413	.123
VT	47.8	.408	.196
ME	49.5	.448	.221
ID	73.5	.335	.246

Source: AARP/CFA Analysis of FCC, Form 496 data base.

A wide variation in costs is evident. Using the most frequent measure of cost, cost per enrollee, we find a low of approximately $.03 per month to a high of $.46 per month. The average is about $.25.

A more appropriate measure of administrative cost may be cost per eligible household, since a significant portion of expenses are for outreach. A small expenditure per enrollee may result from a small expenditure to reach a small eligible population. This is quite different than a small expenditure per enrollee which is caused by a large expenditure for outreach that results in a large number of enrollees.

Table IV-2 shows a considerably different pattern for expenditure per eligible household than per enrollee. These costs run from less than one-third of a cent per month to about $.25. The average is about $.09.

For example, Arizona has relatively high expenditures on both measures. This pattern suggests either vigorous outreach that is relatively unsuccessful (large outreach expenditures fail to achieve large enrollments) or an expensive administrative procedure.

In contrast, Missouri has high expenditures per eligible household, but much lower expenditures per enrollee. Missouri appears to be more successful in reaching the target population on an administrative cost basis.

The Maryland pattern is the reverse. It has high expenditures per enrollee, but very low expenditures per eligible household. This suggests either a lack of outreach efforts or a high cost administrative approach.

Finally, it should be noted that since eligible households are only a small portion of all subscribers, the cost per subscriber is quite small. Administrative costs per subscriber average less than $.01 per month.

One question that frequently arises is whether spending is correlated with performance. Figures IV-1 and IV-2 plot penetration rates against expenditures per eligible household and per enrollee. It is clear that the higher the expenditure per eligible household the higher the percentage of eligible households who enroll. This is not the case for expenditures per enrollee.[1]

Although both measures are relevant to program evaluation, it is not certain which is the better measure of performance. Moreover, the small number of states for which good data is available makes it difficult attempt to refine these measures.

D. ADMINISTRATIVE CHARACTERISTICS AND PROGRAM OUTCOMES

Many factors other than costs may affect program outcomes. In order to ascertain which program characteristics affect participation rates, a simple correlation between key characteristics and participation was run.

For example, we would expect that as the program gains experience over time, become more known in the state, etc., the participation rate would increase. We do observe a positive correlation coefficient which indicates that this is the case, but the small size of the coefficient indicates that the relationship is small.

Further, we would expect that more highly targeted programs would achieve higher participation rates. Based on correlation coefficients, we observe that this is only the case for programs that combined an age requirement and a second, assistance program criteria. States utilizing age plus participation in energy assistance or the food stamp program have achieved higher participation rates. This is not true for age plus a generalized income criteria. For further analysis, an elderly program target variable was created.

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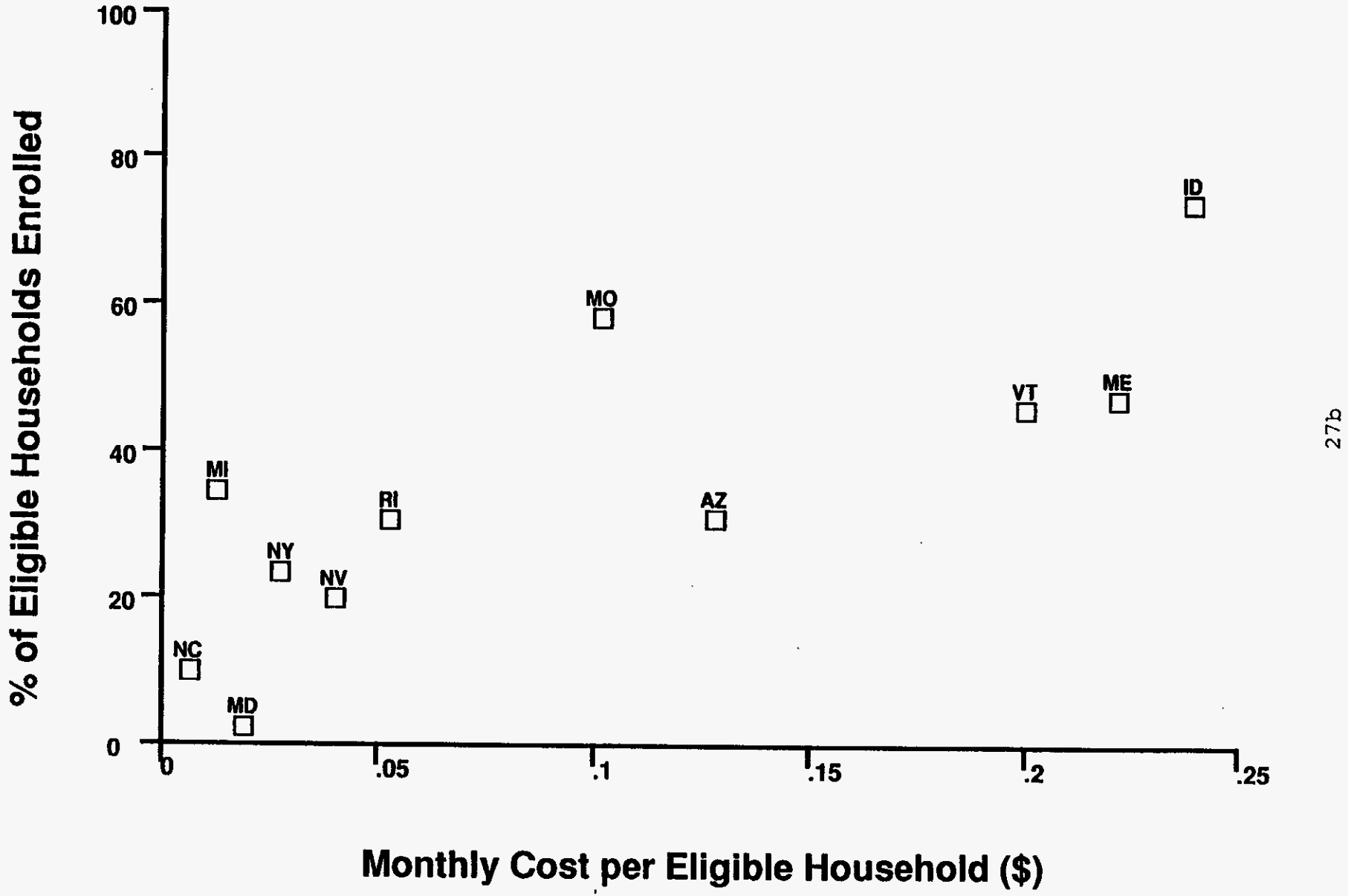
[1] The correlation coefficient between penetration and spending per enrolled household is .20 and not statistically significant. The correlation coefficient between penetration and expenditure per eligible household is .83 and highly significant.

Figure IV-1

Spending and Participation
Expenditure per Enrollee

Figure IV-2

Spending and Participation
Expenditure per Eligible Households



27b

Table IV-3 shows that in those states where the elderly are targeted the average participation rate is .45 (45 percent of the eligible have been enrolled). In states where the elderly are not targeted, the participation rate is .26.

It is generally felt that certification and verification requirements can have an impact on participation. Onerous requirements are potential barriers. This would appear to be the case. States that rely on the individual or self certification have participation rates that are almost twice as high as those which do not.

Outreach efforts can also be expected to have an impact on program performance. This data shows that media-based approaches that rely on television or radio are associated with lower levels of participation. Inserts and brochures (not prepared by telephone companies) are associated with higher rates of participation. The participation rate for programs that rely on written promotion is approximately three times that of those that rely on radio and TV only.

Multiple regression analysis in which these three variables elderly targeting, ease of certification and administrative costs, are simultaneously entered as independent variables to explain program penetration rates shows that three characteristics account of almost half of the variance in penetration rates. Each individual variable is statistically significant and its effect is in the expected direction.

Table IV-3

Participation of Rates and Major Program Characteristics

Variable	Mean Participation Rate
Elderly Target Variable	
No Targeting	.26
Targeting	.45
Ease of Verification	
Neither Individual or Self	.23
Individual or Self	.43
Written Outreach	
TV/Radio Only	.14
TV/Radio and Insert or Brochure	.21
No TV/Radio and Either Insert or Brochure	.43

Source: AARP/CFA Analysis of FCC, Form 496 data base.

An attempt to capture this approach in relatively simple statistical terms by showing the three variables crosstabulated is presented in Table IV-4.[1] States that have none of the three traits that are conducive to high participation rates have the lowest participation rate (.11). Those with one trait range from .14 to .30. States with two traits conducive to higher traits has a rate of .74. Thus, we believe these three characteristics are quite important and deserve careful consideration in program design.

E. OUTCOMES AND IMPACTS

Measuring the outcome of lifeline programs by their participation rates is a burden reduction approach. Since everyone who enrolls in the program receives a benefit, the burden of telephone service on their income is alleviated.

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[1] MULTIPLE REGRESSION ANALYSIS (B and SEB)

	SPECIFICATION 1	SPECIFICATION 2
WRITTEN	.123	.135
	(.041)	(.059)
ELDERLY TARGET	.358	.386
	SPECIFICATION 1	SPECIFICATION 2
	(.145)	(.155)
EASE OF CERTIFICATION	.080	.069
	(.036)	(.039)
ADMIN. COST	na	.266
		(.293)
CONSTANT	.220	.125
	(.037)	(.102)
ADJUSTED R^2	.444	.541
F	6.07	3.94
SIG.	.006	.066

(Variables are defined as: Eldtgt (yes, no), Ease (computer or individual, neither computer nor individual, either individual or self, both individual and self), Written (TV/radio only, TV/radio and insert of brochure, No TV/radio and either insert or brochure, No TV/radio and both insert and brochure). The econometric specifications are presented in the following table. An effort to introduce the administrative cost variable into the analysis is less satisfactory, in part because there are so few cases. It is still interesting to note that the administrative characteristics are "more important" than the spending measure. Each has a coefficient larger than its standard error and larger than the spending variable. The statistical significance is lower in this specification due to the small number of cases.

As difficult as this measure is to assess, universal service impacts are even more difficult to assess.

> The universal service question is "Would those who receive the benefit been forced to go without telephone service had no program been available?"

This is a much more difficult question to answer since it requires the construction of the hypothetical (counterfactual) situation of the absence of the program. At the same time, one must control for other variables, such as cost, income, etc. Micro level data on a household-by-household basis is lacking.[1]

At the macro level, a case can be made that the programs have had an impact. Table IV-5 shows that the penetration rate among the poorest households, the vast majority of whom are likely to be eligible for telephone assistance benefits, rose sharply in 1989, after the Link Up program was put in place and when the Lifeline program achieved significant penetration among the states.

This pattern is different than the pattern for the national average penetration rate. In the national average figures, gains in penetration rates were exhibited from 1984 forward. Moreover, although price increases were larger in the early years, there were national average price increases at the time that penetration rates were increasing among low income households.

F. CONCLUSION

Although the number of programs for which detailed data is available is small, there are several conclusions that can be offered.

First, the restrictive definition of eligibility in some states has reduced the eligible population. At most, about nine million people, less than five percent of the national population, are eligible for one or more of these programs.

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[1] The Colorado experience of terminating a program provided an opportunity to assess the impact of the removal of the program. A follow-up study showed that some households gave up service because they could not afford it without the assistance program (see FCC, Annual Report, op. cit., p. 60).

Table IV-4

Crosstabulation of Factors Affecting Participation Rates

	Elderly Targeting			
	No		Yes	
	Individual Certification		Individual Certification	
	No	Yes	No	Yes
Radio/TV Only	.11 (n=2)	.30 (n=1)	.30 (n=2)	N/A
TV/Radio + Written	.14 (n=5)	N/A	N/A	N/A
Written/ No TV/Radio	.25 (n=9)	.43 (n=6)	.74 (n=1)	N/A

Source: AARP/CFA Analysis of FCC, Form 496 data base.

Table IV-5

Assistance Programs and Telephone Subscription Among Low Income Households

Year	Monthly Cost Flat Rate ($)	National Avg. Penetration	Low Income Penetration	States With Link-up	States With Lifeline
83	11.58	91.4	71.7	0	0
84	13.35	91.4	70.3	0	0
85	14.54	91.9	72.7	0	1
86	16.13	92.4	72.3	0	5
87	16.66	92.3	71.5	2	15
88	16.57	92.5	71.5	28	25
89	17.54	93.0	75.8	44	27

Source: FCC, Annual Report, Tables 1.1, 1.4, 2.4, 2.5, 5.7., 1990.

Second, even with the relatively small target population, participation rates are not high. Although this may reflect the relatively recent implementation of these programs, there remains a great deal of work to be done to get participation rates up to the levels achieved by other assistance programs.

Third, the administrative cost of these programs are quite variable, but not large. Measured in terms of expenditures per enrollee, they average about $.25 per month. Measured in terms of cost per telephone subscriber, the costs are less than $.01 per month.

Fourth, although the data base is small, a few program characteristics appear to be associated with higher participation rates. These include targeting for the elderly, ease of certification and use of written materials for information dissemination.

Finally, although data to assess the impact of the program in terms of larger goals is sparse, a plausible case can be made that the programs have been having an impact.

V. SUMMARY OF STATE PROGRAMS

Unless otherwise stated, all Link Up plans include the FCC-mandated requirement that subscribers not be a dependent for federal income tax purposes, unless they are more than 60 years of age.

The benefit on all Link Up plans is limited to $30, unless otherwise stated, and includes FCC payment for cost of amortizing remaining installation charges over 12 months.

A. ALABAMA

1. Telecommunications

Link Up

Eligibility: Must meet the requirements of a state established income test.

Benefits: Reduction of installation fee by half.

Certification: Individual must provide documentation to company.

Outreach: Publicized by Public Service Agencies.

2. Energy Utility Programs

License Tax Waiver (10/1/81)

Eligibility: Must be (1) older than 61 or totally and permanently disabled and (2) head of household and have (3) household income of less than $12,000.

Benefits: State waives 2.2% license tax.

Certification: Certified by Alabama Finance Department.

Outreach: None (The legislation which created the program did not include a provision for outreach. Department of Human Services does not do any.)

Rate Rider SSI -- offered by Alabama Power Co and some of the large gas utilities (Alabama Power start date 4/90)

Eligibility: Must qualify for SSI (or AFDC for Alabama Power).

Benefits: Monthly customer charge ($7) waived.

Certification: Certified by the Alabama Department of Human Resources.

Outreach: Bill inserts; presentations to consumer groups.

Funding: Through rates charged to non-participating residential rate payers.

B. ALASKA

No lifeline programs are offered in the state of Alaska.

C. ARIZONA

1. Telecommunications

Telephone Assistance Pilot Program

Eligibility: Must reside in designated U.S. West service exchange areas and be at 150% or less of poverty level.

Benefits: Basic rotary dial monthly service fee (varies across state); monthly inside wiring maintenance fee ($.45); monthly phone rental from AT&T ($2.70); one-time hook-up charge for new installations $46.50); and one-time change of service fee ($27.50).

Certification: Volunteer agency interviewers verify income for past 30 days, social security numbers for all adults in household, current telephone bill, note from doctor indicating medical need (if applicable). Recertified periodically.

Outreach: Training sessions with social service providers, presentations to community agencies and targeting special populations such as medical programs, AIDS groups and Division of Developmental Disabilities.

Funding: From an account established with money that U.S. West was required to refund from an overcharge. The excess that could not be refunded to actual overcharged customers was put in this account instead.

Senior Telephone Discount Program

Eligibility: Must be head of household, 65 years of age or older, and have income at or below 100% of poverty.

Benefits: $2 per month plus matching waiver from FCC.

Certification: Self-certified. Applicants are recertified annually.

Outreach: Bulk mailings of information, applications, brochures to social service/community service providers, presentations to Community Service Agencies, newspaper articles, and radio spots.

Funding: Through a state tax credit.

Link Up

Eligibility: Must have income at or below federal poverty level and participate in Senior Telephone Discount Program, as determined by Arizona Department of Social Security.

Benefits: Reduction of installation fee by half.

Certification: Same as Senior Telephone Discount Program.

Outreach: Same as Senior Telephone Discount Program.

2. **Energy Utility Programs**

Arizona Public Service pilot program (9/88; amended 10/89)

Eligibility: Must be at or below 150% of poverty.

Benefits: Discount on bill based on monthly consumption level:

30% discount	if monthly usage is under 401 kWh
20% discount	401 - 800 kWh
10% discount	801 - 1200 kWh

Certification: By the Arizona Department of Economic Services.

Outreach: Bill inserts.

Funding: Revenues recovered from all jurisdictional customers in the form of a surcharge applied to each kWh sold.

Tucson Electric Power pilot program (1/90)

Eligibility: Must be at or below 150% of poverty.

Benefits: Discount on bill based on monthly consumption level:

20% discount	if monthly usage is under 301 kWh
15% discount	301 - 600 kWh
10% discount	601 - 1000 kWh

Certification: Self-certified (as mandated by PUC). Recertified annually.

Outreach: Kick-off events; mail applications to all customers; information distributed through radio and print media, low-income centers, thrift centers and elsewhere; AFDC check inserts.

Funding: Through general rates.

D. ARKANSAS

1. Telecommunications

Lifeline (trial offering)

Eligibility: Southwestern Bell customers who receive food stamps, medicaid, SSI or AFDC.

Benefits: A reduction of over 50% in monthly recurring charges.

Certification: Annual certification by the Arkansas Department of Human Services.

Outreach: Community relations teams; posters and materials available at state and local welfare offices and other community sites; have Literacy Council help in the design of posters and brochures.

Funding: Through general rates.

Link Up

Eligibility: Must receive food stamps, Medicaid, SSI, home energy assistance, AFDC, or subsidized housing assistance.

Benefits: Reduction of installation fee by half.

Certification: Certification is received through Department of Human Services, Social Services, and HUD offices by means of individual social security numbers.

Outreach: Radio, television, newspaper and telephone company representatives. Department of Human Services mails out Link Up pamphlets quarterly; staff inform new clients about the program.

2. Energy Utility Programs

None

E. CALIFORNIA

1. Telecommunications

Universal Lifeline Telephone Service

Eligibility: Household income must not exceed $14,300 for one or two people, $16,900 for three people, or an additional $3,300 for each additional household member.

Benefits: 50% off on basic monthly service charges.

Certification: Self-certification. Recertified annually.

Outreach: Annual bill inserts including form for self-certification; service representatives tell new customers about the service; Pacific Bell offers an 800 number and brochures in five languages; community based agencies under contract with Pacific Bell promote service.

Funding: Funded by 3% surcharge on all non-local calls within California.

2. Energy Utility Programs

Low Income Ratepayer Assistance Program

Eligibility: Must receive AFDC, SSI/State Supplementary Program (SSP), Veterans' or Survivors' Pension, food stamps or have income of 150% of federal poverty or less (except customers of Pacific Power & Light, which uses 130% of poverty).

Benefits: 15% discount on energy bills.

Certification: Individual must supply documentation to the utility. Verification undertaken by utility or by California Department of Economic Opportunity.

Outreach: Bill inserts; social services agencies; Department of Economic Opportunity uses a combined LIHEAP/LIRA application.

Funding: Rolled into general rates.

F. COLORADO

1. Telecommunications

Lifeline was terminated by the legislature in February, 1989. Link Up was approved by FCC but never implemented and also terminated in February, 1989. Legislation passed in 1990 reauthorized these programs. Descriptions apply to the reauthorized programs.

Lifeline

Eligibility: Must receive Aid to the needy disabled, Aid to the blind, Old age pensions or low-income disabled SSI recipients.

Benefits: 25% discount on single local dial tone, flat rate usage charge and mileage charges (where applicable).

Certification: Colorado Department of Social Services determines eligibility. Twice a year DSS and U.S. West compare records to determine continued eligibility. Those ineligible are removed from the program.

Outreach: Print and television; bill inserts; brochures; U.S. West speaker's bureau.

Funding: Uniform charge levied on each business and non-eligible residential access line.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

None

G. **CONNECTICUT**

1. **Telecommunications**

Link Up

Eligibility: Must be eligible for or receiving SSI or eligible for or receiving assistance from a low income assistance or energy assistance program administered by the Connecticut Department of Income Maintenance and Human Resources.

Benefits: Reduction of installation fee by half.

Certification: Individual provides documentation to the telephone company.

Outreach: Brochures distributed by and available at the Department of Income Maintenance and telephone company service centers.

2. **Energy Utility Programs**

None

H. DELAWARE

No lifeline programs are offered in the state of Delaware.

I. DISTRICT OF COLUMBIA

1. **Telecommunications**

Lifeline

Eligibility: Must be 65 or older and qualify for LIHEAP or District of Columbia Complementary Energy Assistance Program.

Benefits: Monthly fee reduced by $3.97.

Certification: Eligibility certified by District of Columbia Energy Office.

Outreach: Radio public service announcements; print articles; telephone company business offices; speaker's bureau mailings from DC Energy Office; meetings between telephone company ang social service agency officials.

Funding: Funded out of general rates.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

Residential Aid Rider Program

Eligibility: Electric utility customers who qualify for LIHEAP.

Benefits: 25% off on the first 400 kwh per month.

Certification: Applicants provide documentation.

Outreach: Contacts with local organizations that serve senior citizens or low income individuals; radio, print and television advertisements; brochures; posters; monthly sign-up sessions.

Funding: Revenue shortfall recovered from residential customer class across the board.

J. FLORIDA

1. Telecommunications

Link Up

Eligibility: Must be eligible for or receiving Medicaid or food stamps.

Benefits: Reduction of installation fee by half.

Certification: Florida Health and Rehabilitative Services verifies eligibility.

Outreach: Newspaper advertisements; fliers; bill inserts; social agencies; marketing.

2. Energy Programs

Key West Municipal Utility offers a lifeline rate for those 60 and over or disabled verterans with a service-related disability whose monthly income is under $737.50 per month.

For 0 to 49 kwh	they pay	0
50-215 kwh		$2.53
216-431 kwh		4.39
over 432 kwh		6.29

K. GEORGIA

1. Telecommunications

Link Up

Approved by the FCC, Link Up will be offered starting in 1990.

Eligibility: Must receive SSI, AFDC or food stamps or benefits from the energy companies' Senior Citizens Discout Plans.

Benefits: Reduction of installation fee by half.

Certification: Certified by the Georgia Department of Human Resources.

Outreach: Press releases; inserts in phone bills; fliers to all AFDC and food stamp recipients; fliers and application forms at social service agencies; fliers available at churches, civic groups and other state agencies.

2. **Energy Utility Programs**

Senior Citizens Discount Plan

Georgia Power & Electric and Atlanta Gas Light Co.

Eligibility: Must be 65 or older with household income less than or equal to $10,000.

Benefits: Waiver of $7.50/month base charge for electric customers; wiaver of approximately $1/month for gas customers.

Certification: Self-certified.

Outreach: Bill inserts.

Funding: Funded through general rates.

L. HAWAII

1. Telecommunications

Lifeline

Eligibility: Must be (1) either 60 or older or handicapped and (2) have household income of $10,000 or less. Must be the applicant's principle place of residence. There cannot be more than one access line.

Benefits: A savings of $2.70 on monthly recurring charges.

Certification: Individual must provide documentation to the telephone company.

Outreach: Press releases; bill inserts; fliers for social service agencies to distribute.

Funding: Revenue shortfall is offset by a discount in the state excise tax.

Link Up

Eligibility: Must have income of not more than $10,000; must not qualify for Lifeline; must have only one access line at principle place of residence.

Benefits: Reduction of installation fee by half.

Certification: Applicant must provide proof to telephone company (which could be photocopy of Medicaid card).

Outreach: Press releases; customer newsletters; posters; description in telephone directories.

2. Energy Utility Programs

None

M. IDAHO

1. Telecommunications

Lifeline

Eligibility: Must be head of household, 60 or older and receive LIHEAP benefits.

Benefits: Provides a credit against monthly service equal to the federal subscriber line charge (combined total - $7/month).

Certification: By Idaho Department of Health & Welfare.

Outreach: Press releases, bill inserts and mailings to LIHEAP recipients.

Funding: Uniform monthly surcharge assessed by each company on all business and residential access lines not receiving assistance credit. Charges range from 5¢ to 19¢ per month, averaging 7.5¢.

Link Up

Eligibility: Must receive AFDC; Medical assistance; Aid to the aged, blind or disabled; food stamps; or LIHEAP.

Benefits: Reduction of installation fee by half.

Certification: Individual provides documentation to the company.

Outreach: Press releases and bill inserts.

2. **Energy Utility Programs**

None

N. **ILLINOIS**

1. **Telecommunications**

Link Up

Eligibility: Must receive AFDC; Aid to the aged, blind, and disabled; food stamps; general assistance (Chicago only); Refugee/Repatriate programs; or Medical assistance.

Benefits: Reduction of installation fee by half.

Certification: From documentation provided by the applicant or by company in conjunction with Illinois Department of Public Aid.

Outreach: Annual press releases (quarterly releases the first year); mailing to all qualifying assistance program recipients).

2. **Energy Utility Programs**

Offers the Residential Energy Assistance Partnership Program (which gives either cash payments determined by location, number in household and type of fuel used or monthly utility payments of 12% of income) but no lifeline.

O. **INDIANA**

1. **Telecommunications**

Link Up

Eligibility: Must receive AFDC; Medicaid; food stamps; home energy assistance program; or subsidized housing assistance.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Press releases; TV and radio coverage; program information available at public assistance offices, telephone company business offices, and the Commission.

2. **Energy Utility Programs**

None

P. **IOWA**

1. **Telecommunications**

Link Up

Eligibility: Must be eligible for AFDC; food stamps; SSI; Title XIX/Medical; low-income energy assistance program; or state supplementary assistance.

Benefits: Reduction of installation fee by half.

Certification: Individual provides documentation to the company.

Outreach: Brochures available from telephone companies and welfare assistance agencies.

2. **Energy Utility Programs**

None

Q. **KANSAS**

1. **Telecommunications**

Link Up

Eligibility: Participation in AFDC; SSI; General Assistance; Medicaid; food stamps; or food distribution program.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Press releases; bill inserts; newspaper advertisements; social service agencies inform clients; posters and pamphlets.

2. **Energy Utility Programs**

None

R. KENTUCKY

1. Telecommunications

Link Up

Eligibility: Must receive AFDC; SSI; food stamps; or Medicaid.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company, except for food stamp recipients, verified by Kentucky Cabinet for Human Resources.

Outreach: Press releases; bill inserts; inserts in monthly mailing to assistance program recipients.

2. Energy Utility Programs

None

S. LOUISIANA

1. Telecommunications

Link Up

Eligibility: Must receive AFDC; SSI; or food stamps. (Participation in Link Up by the small companies is voluntary and many do not offer Link Up.)

Benefits: Reduction of installation fee by half.

Certification: Certified by the Louisiana Department of Health and Hospitals.

Outreach: bill inserts; insert in mailings to assistance recipients; posters in assistance offices.

2. Energy Utility Programs

None

T. MAINE

1. Telecommunications

Lifeline

Eligibility: Must receive fuel assistance (HEAP); Medicaid; food stamps; AFDC; or SSI.

Benefits: Reduction in monthly bill equal to the federal subscriber line charge.

Certification: Application is verified by the Maine Department of Human Services or the applicant provides documentation to the company.

Outreach: Bill inserts; pamphlets; video production; solicitations at installation/transfer of service/restoral; "Phone me" campaign, a non-profit citizens effort to inform and sign up eligible customers (funded by New England Telephone).

Funding: Funded by ratepayers at each local exchange company.

Link Up

Eligibility: Must receive fuel assistance (HEAP); Medicaid; food stamps; AFDC; or SSI.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. Energy Utility Programs

None (although the PUC is presently involved in litigation over this issue).

U. MARYLAND

1. Telecommunications

Lifeline

Eligibility: Must receive General Public Assistance or SSI.

Benefits: Fifty percent reduction in lowest cost residential monthly service ($2.53 after reduction) and a 50% reduction in the cost of the first thirty outgoing calls per month (from 9¢ to 4.5¢).

Certification: Maryland Department of Human Resources verifies SSI benefits annually and GPA benefits semi-annually and forwards data to the local exchange company.

Outreach: The Department of Human Resources generates referrals to the company. The company also informs potential customers if credit information so warrants.

Funding: The State of Maryland permits C&P to reduce the amount of its Gross Receipts Tax for all charges not billed to Lifeline customers as a result of the discounts provided for under the program.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. Energy Utility Programs

None

V. MASSACHUSETTS

1. Telecommunications

Lifeline

Eligibility: Must receive AFDC, general relief, SSI, fuel assistance, Medicaid, or food stamps.

Benefits: $3.50 per month, matched by SLC waiver.

Certification: Verified by the Massachusetts Department of Public Welfare or Energy Office.

Outreach: Bill inserts.

Funding: Funded through general rates.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

Eligibility: Must be head of household and an SSI recipient.

Benefits: Gas customers receive a 20% discount. Electricity customers receive a discount which varies by company. (Customers of Boston Edison receive a 60% discount on the monthly charge and on the first 350 kwh of usage per month.)

Certification: Self-certified; recertified annually.

Outreach: Bill inserts.

Funding: Funded through rates charged to other customers.

W. MICHIGAN

1. Telecommunications

Lifeline

Eligibility: Must have household income at or below 130% of poverty.

Benefits: A savings of $4 on monthly recurring charges.

Certification: Application information is input into the O/E Managemnet Services (processing agency) computer system. A validation check is performed based on income level, existing service and social security number.

Outreach: Service representatives offer the service when appropriate in taking orders for new service or service transfer to a new address; bill inserts; publicity (including mailings) coordinated with the Department of Social Services; posters and brochures provided to most community agencies.

Funding: Funded through a surcharge currently set at 14¢ per access line. Because the program is currently overfunded, the access charge will soon be lowered to 3¢ per line until the excess reserves are absorbed.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

Michigan Consolidated Gas

Eligibility: Must be 65 or older and at or below 100% of poverty.

Benefits: $12 per month towards gas bill for the months of December through March.

Certification: Applicants provide proof of age and income to the company.

Outreach: presentations to seniors groups; bill inserts; brochures.

X. MINNESOTA

1. Telecommunications

Lifeline

Eligibility: Must be (1) disabled or 65 or older; (2) not receiving any other state assistance for telephone service (to limit assistance to one access line per recipient); and (3) eligible for AFDC, medical assistance, general assistance, Minnesota supplemental aid, food stamps, refugee cash assistance or refugee medical assistance, energy assistance, or SSI.

Benefits: $3.50 per month, matched by SLC waiver. (For a small minority of Minnesota customers, the access charge is less than $3.50. For those customers, the benefit is the access charge which is matched by a lesser reduction in the SLC.)

Certification: Verified by the Department of Human Services or applicant provides documentation to the company.

Outreach: Annual bill inserts; press releases; speaking engagements with senior citizen groups; special mailings to disabled groups.

Funding: A uniform monthly surcharge (not to exceed 10¢ per access line) is assessed on all lines across the state.

Link Up

Eligibility: Must be eligible for AFDC, medical assistance, general assistance, Minnesota supplemental aid, food stamps, refugee cash assistance or refugee medical assistance, energy assistance, or SSI.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. Energy Utility Programs

Minnesota has a cold-weather rule which limits service terminations, but no lifeline.

Y. MISSISSIPPI

1. Telecommunications

Link Up

Eligibility: Must qualify for Medicaid or food stamps.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Brochures are distributed to all agencies that deal with low-income individuals; press releases.

2. Energy Utility Programs

None

Z. MISSOURI

1. Telecommunications

Lifeline

Eligibility: Must (1) be 65 or older or disabled; (2) have household income of $7,500 per year or less; and (3) be eligible for energy assistance.

Benefits: Waiver of SLC plus matching waiver.

Certification: Verified by the Missouri Department of Social Services.

Outreach: No public media coverage as per agreement with the Missouri Division of Family Services; direct mailings to eligible individuals by Southwestern Bell.

Funding: Funded through general rates.

Link Up

Eligibility: Must receive Medicaid or Medicare.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Press releases; public notices.

2. **Energy Utility Programs**

None

AA. MONTANA

1. **Telecommunications**

Lifeline

Eligibility: Must receive Medicaid; have telephone service listed in applicant's name and not have more than one access line.

Benefits: A discount in monthly service equal to the greater of $2 or the amount necessary to obtain the matching waiver of the SLC from the FCC.

Certification: Verified by the Montana Department of Social and Rehabilitative Services. Recertified annually.

Outreach: Initial mailing to all Medicaid recipients; customer service representatives query new customers to determine if they are Medicaid recipients and, if so, if they want to participate in the program.

Funding: Costs embedded in rates.

Link Up

Eligibility: Must be a Medicaid recipient.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Notice sent to Medicaid recipients; customer service representatives query new service applicants as to Medicaid enrollment and interest in program.

2. Energy Utility Programs

Montana has a cold-weather rule which limits service terminations but no lifeline.

AB. NEBRASKA

1. Telecommunications

Link Up

Eligibility: Must receive SSI, AFDC, Aid to the Aged, Blind and Disabled, Medicaid, Energy Assistance, or have income at or below 140% of poverty.

Benefits: Reduction of installation fee by half.

Certification: Agency administering appropriate entitlement program initials application.

Outreach: Social service agencies have brochures, posters and applications; Community Action Programs; phone companies advertise, post posters; bill inserts; PSC has a hotline for consumer inquiries.

2. Energy Utility Programs

None

AC. NEVADA

1. Telecommunications

Lifeline

Eligibility: Must be head of household, have only one access line and be receiving AFDC, food stamps, energy assistance (HEAP), Medical assistance, SSI or Social Security Disability.

Benefits: $2 reduction in local monthly charges plus matching SLC waiver.

Certification: Applicant provides documentation to the company.

Outreach: Annual bill insert.

Funding: Funded by stockholders.

Link Up

Eligibility: Must be eligible for or receiving energy assistance, AFDC, food stamps, Indian general assistance, SSI, commodity foods or VA improved pension; and have only one access line, which must be at principle place of residence.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Annual bill inserts; initial press release.

2. Energy Utility Programs

None

AD. NEW HAMPSHIRE

1. Telecommunications

Link Up

Eligibility: Must receive AFDC, fuel assistance, weatherization assistance, WIC program, old age assistance, aid to permanently/totally disabled, aid to needy blind, SSI or town/city welfare.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Poster with brochures/application form posted in lobbies and business offices of telephone companies; some on display at town and state offices; largest telephone company provides brochures to new recipients of assistance programs.

2. **Energy Utility Programs**

None

AE. NEW JERSEY

1. **Telecommunications**

Link Up

Eligibility: Must receive home energy assistance, AFDC, SSI/Medicaid, food stamps, general assistance, lifeline utility credit/tenants lifeline assistance, or pharmaceutical assistance to the aged and disabled.

Benefits: Reduction of installation fee by half.

Certification: Verified by the Department of Human Services.

Outreach: Posters and brochures placed in all welfare offices; advertisement placed in 28 newspapers across the state; 800 number; materials provided in both English and Spanish.

2. **Energy Utility Programs**

None

AF. NEW MEXICO

1. **Telecommunications**

Lifeline

Eligibility: Must be a Medicaid recipient who participates in SSI, AFDC or coordinated community in-home care.

Benefits: Waiver of $3.50 SLC plus matching waiver.

Certification: Applicant provides documentation to company. New Mexico Human Services Department periodically runs tape to tape comparisons to generate a list of those who are eligible but not

enrolled. Applications are mailed to these individuals; if they are completed and filed with the company no documentation is needed.

Outreach: Applications to Medicaid recipients; bill inserts to all subscribers; newspaper advertisements; town meetings; information packets in Human Services Department field offices, community centers, senior centers, service agencies.

Funding: Funded by U.S. West in conjunction with a rate reduction which was less than it would otherwise have been.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half. (Western New Mexico Telephone Company offers its own 50% discount, up to $30, on installation fees.)

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

None

AG. NEW YORK

1. **Telecommunications**

Lifeline

Eligibility: Must receive Medicaid, food stamps, home relief, SSI, AFDC, or home energy assistance.

Benefits: For New York Telephone, generally a message rate access line of $1 per month, waiver of the SLC, waiver of locality charges and a 10% discount on the first $5-$10 of monthly usage. For other companies, a waiver of the SLC and of any applicable locality mileage charges.

Certification: Generally verified by state or county Social Services Department.

Outreach: Bill inserts; bill messages; direct mailings; and through social services agencies and PSC informational literature.

Funding: Included in general rates.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Newspaper advertising and through social service agencies.

2. Energy Utility Programs

None

AH. NORTH CAROLINA

1. Telecommunications

Lifeline

Eligibility: Must receive AFDC or SSI.

Benefits: Waiver of SLC plus matching waiver.

Certification: Applications can only be received from the appropriate social service agency and are pre-certified by the caseworker. Recertified semi-annually by comparing computer tape of those receiving benefits with that of those receiving assistance.

Outreach: Direct mail to AFDC recipients; bill inserts; press releases; agency caseworkers.

Funding: Phone companiers claim a tax credit equal to the amount of revenue foregone.

Link Up

Eligibility: Must receive AFDC, food stamps or SSI.

Benefits: Reduction of installation fee by half.

Certification: Certified by the appropriate social service agency.

Outreach: Inserts mailed by the Department of Social Services to food stamp and AFDC recipients; press releases; press conferences; information brochures as handouts in food stamp, AFDC and SSI offices (provided on an ongoing basis to new recipients); bill inserts; telephone company service representatives.

2. **Energy Programs**

Experimental electricity rate (since early 1980s)

Eligibility: Must be an SSI recipient.

Benefits: Credit of $3/month, the charge for the first block of electricity.

Certification: North Carolina Social Security Department gives Duke Power a computer tape of those receiving SSI; credit is automatically given to those whose names are on the tape. Customers must apply separately if electricity service is in someone else's name.

Funding: Revenues recovered from other ratepayers.

AI. NORTH DAKOTA

1. **Telecommunications**

Link Up

Eligibility: Must be eligible for food stamps.

Benefits: Reduction of installation fee by half.

Certification: Self-certified; must be endorsed by company or by Social Service Agency.

Outreach: Press releases; through the North Dakota Department of Human Services.

2. **Energy Utility Programs**

None

AJ. OHIO

1. **Telecommunications**

Lifeline

Eligibility: Must receive assistance from Home Energy Assistance Program (HEAP) or Ohio Energy Credits Program (OECP).

Benefits: Waiver of service deposit and half of installation fee plus waiver of $3.50/month SLC for as many months as it takes to equal the amount waived (averages about 18 months).

Certification: Applicant provides documentation to the company.

Outreach: bill inserts; brochures provided to local community action agencies and welfare offices; company service representatives inform new customers of service availability.

Funding: Funded by a state-wide telephone line charge, not to exceed 20¢ per month.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Varies from none to initial press releases; directory notices; bill inserts; providing information to local energy assistance offices; questioning applicants for new service about their eligibility.

2. Energy Utility Programs

None

AK. OKLAHOMA

1. Telecommunications

Link Up

Eligibility: Must receive assistance of any type from the Oklahoma Department of Human Services.

Benefits: Reduction of installation fee by half.

Certification: Verified by the Department of Human Services.

Outreach: Newspaper articles; fliers in Department of Human Services' offices; DHS agents inform clients of the program.

2. Energy Utility Programs

None

AL. OREGON

1. Telecommunications

Lifeline

Eligibility: Must be eligible for food stamps.

Benefits: $3.50 per month, matched by SLC waiver.

Certification: Applications are filed with the PUC; staff have computer access to food stamp records to confirm eligibility. Names of verified applicants are sent to company. Recertified annually.

Outreach: information fliers; 800 number; caseworkers give applications to new and re-enrolled eligible households.

Funding: Legislated surcharge on all but recipient access lines of 5¢ per month.

Link Up

Eligibility: Must be eligible for food stamps; AFDC; Oregon Supplemental Income Program; SSI; general assistance; welfare medical ID card; In-home Services Programs for Seniors; LIEAP; or low income weatherization assistance program.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Food stamp caseworkers give Link Up applications to new and enrolled eligible households.

2. Energy Utility Programs

None

AM. PENNSYLVANIA

1. Telecommunications

Link Up

Eligibility: Must receive AFDC; Categorically Needy Medical Assistance; food stamps; general assistance; LIHEAP; Medically Needy Only Medical Assistance; State blind pension; or SSI or qualify under state income guidelines.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation or application is certified by state agency.

Outreach: Press releases; bill inserts; directory listing.

2. **Energy Utility Programs**

None

AO. RHODE ISLAND

1. **Telecommunications**

Lifeline

Eligibility: Must receive SSI; AFDC; general public assistance; aid from the Rhode Island medical assistance program; food stamps; or LIHEAP.

Benefits: A reduction of $3.50 per month, applicable to one- or two-party exchange service, and matching waiver of SLC.

Certification: Application made to the telephone company. Eligibility is confirmed and verified bi-monthly by the Department of Human Services which compares computer tapes of those participating in the requisite programs with those receiving benefits.

Outreach: Bill inserts; DHS advises new clients and sends additional mailings to all clients every six months.

Funding: Absorbed by telephone company because it has been overa hieving in the last three years.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

Has a Percentage of Income Payment Program but no lifeline.

AP. SOUTH CAROLINA

1. Telecommunications

Link Up

Eligibility: Must receive AFDC; food stamps; medicaid; or temporary emergency food assistance.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company.

Outreach: Press releases; inserts to assistance program recipients; fliers given to new clients; bill inserts.

2. Energy Utility Programs

None

AQ. SOUTH DAKOTA

1. Telecommunications

Lifeline

Eligibility: Must be a U.S. West customer who is 60 or older and receiving food stamps or LIEAP.

Benefits: Monthly reduction of $3.50, matched by SLC waiver.

Certification: Applications are available only through South Dakota Department of Human Services, which gives them to eligible individuals.

Outreach: Brochures and applications mailed to assistance recipients; brochures available to social workers.

Funding: Authorized charge of 5¢ per access line per month never utilized by U.S. West. Opportunity to implement the surcharge forfeited as part of settlement with PUC of impact of 1986 Tax Reform Act.

Link Up

Eligibility: U.S. West customers who receive food stamps or LIEAP.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

None

AR. TENNESSEE

1. **Telecommunications**

Link Up

Eligibility: Must receive SSI; AFDC; food stamps; or Medicaid or have income at or below 125% of poverty.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to the company or application is verified by the Tennessee Department of Human Resources.

Outreach: Press releases; bill inserts.

2. **Energy Utility Programs**

None

AS. TEXAS

1. **Telecommunications**

Lifeline

Eligibility: Applicant must be head of household; 65 or older; disabled; and have income at or below federal poverty level.

Benefits: 65% reduction on local monthly charges. Local companies also have the option of establishing their own lifeline plans.

Certification: Applications received and certified by the Texas Department of Human Services; names of eligible applicants given to company.

Outreach: Press release; bill inserts; directory notice; DHS maild applications to assistance recipients.

Funding: Expenses (including administrative costs) are paid for by a Universal Service Fund, funded by interexchange and local companies on a charge per unit of usage.

Link Up

Eligibility: Must receive AFDC; HEAP; MAP; SSI; WIC; or food stamps or meet qualifying income levels or qualify for Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Applicant provides documentation to company.

Outreach: Press releases; bill inserts; DHS mailings to clients; posters; pamphlets; talk shows; meetings with organizations.

2. Energy Utility Programs

None (although Gulf States Utility has proposed a senior citizen discount in its latest rate case. The rate would aive the monthly customer charge for those 65 or older whose income is $10,000 per year or less.)

AT. UTAH

1. Telecommunications

Lifeline

Eligibility: Must receive AFDC; emergency work program; food stamps; general assistance; home energy assistance; medical assistance; refugee assistance; SSI; or be at or below 125% of poverty.

Benefits: Pay no more than threshold rate of $9.50 for local monthly charges.

Certification: Annual review administered by the Utah Department of Social Services.

Outreach: Utah Department of Social Services notifies eligible applicants; ads in a seniors' newspaper.

Funding: Surcharge on non-enrolled customers of 10¢ per month.

Link Up

Eligibility: Must receive AFDC; emergency work program; food stamps; general assistance; LIHEAP; medical assistance; refugee assistance; or SSI.

Benefits: Reduction of installation fee by half.

Certification: Applications verified by the Utah Department of Social Services.

Outreach: None.

2. **Energy Utility Programs**

None

AU. VERMONT

1. Telecommunications

Lifeline

Eligibility: Must receive ANFC; food stamps; fuel assistance; Medicaid; or SSI.

Benefits: Monthly waiver on service exceeds SLC matching waiver by $2.

Certification: Applications submitted to Vermont Department of Social Welfare which verifies eligibility and notifies company. DSW also published an annual list of those no longer eligible.

Outreach: Annual notices sent to all customers by companies and to all clients by Department of Social Welfare.

Funding: Through a charge on the basic rates of all telephone users ($.34 per month as of October 1989).

Link Up

Began in 1990

Eligibility: Must receive ANFC; Medicaid; food stamps; fuel assistance; SSI; subsidized housing; WIC; or aid from Community Action Agency programs.

Benefits: Reduction of installation fee by half.

Certification: Applicant must provide documentation or have application validated by state agency staff person.

Outreach: Bill inserts (one time only); mailing to clients by the Department of Social Welfare; posters in social services and advocacy offices; press releases; newspaper articles.

2. **Energy Utility Programs**

None

AV. VIRGINIA

1. **Telecommunications**

Lifeline

Eligibility: Must receive Medicaid.

Benefits: Approximately half off local service.

Certification: Virginia Department of Medical Assistance Services is contected periodically to verify eligibility.

Outreach: Newspaper articles; bill inserts; Department of Medical Assistance Services notifies new Medicaid recipients of service.

Funding: Through local rates.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: Same as Lifeline.

Outreach: Same as Lifeline.

2. **Energy Utility Programs**

None

AW. WASHINGTON

1. **Telecommunications**

Lifeline

Eligibility: Anyone receiving assistance from Washington Department of Social and Health Services programs for the financially needy which provide continuing financial or medical assistance, food stamps, or supportive services to persons in their own homes.

Benefits: Reduction of installation fee by half and threshold on one access line of $8 for local monthly charges.

Certification: Applications are provided by Department of Social and Health Services; when turned in to telephone company, company must call DSHS and confirm validity of application.

Outreach: Anyone who becomes eligible for DSHS services automatically gets an information kit with instrauctions on how to apply.

Funding: Telephone assistance excise tax on all switched lines of 5¢ per month.

Link Up

Application approved; program will go into effect in late 1990. Eligibility criteria, certification and outreach will probably copy those for the Lifeline program.

2. Energy Utility Programs

None

AX. WEST VIRGINIA

1. Telecommunications

Lifeline

Eligibility: Must (1) be either disabled or 60 or older; (2) receive SSI; AFDC; aid to dependent children-unemployed; food stamps; or have income at or below SSI cut-off level; and (3) have telephone service listed in qualifying applicant's name.

Benefits: $7.50 per month, including $2 of local calling charges.

Certification: Qualifying individuals are sent a computer-generated application to fill out and submit to company; those not receiving benefits must submit documentation to West Virginia Department of Health and Human Services.

Outreach: Department of Health and Human Services sendsa package of information to clients; bill inserts.

Funding: Offset by a credit against state telecommunications tax.

Link Up

Eligibility: Same as Lifeline.

Benefits: Reduction of installation fee by half.

Certification: By the West Virginia Department of Human Services.

Outreach: Directory listing; bill inserts; press releases.

2. Energy Utility Programs

None

AY. WISCONSIN

1. Telecommunications

Link Up

Eligibility: Must receive AFDC; food stamps; Title 19 medical assistance; SSI; or LIEAP.

Benefits: Complete waiver of installation charges (no more than one per year).

Certification: Company service representative dials Wisconsin Department of Health and Social Services database to confirm whether applicant is found in any of the relevant databases (which program is not specified).

Outreach: Department of Health and Social Services includes an annual insert with benefit checks; directory listing; service reps describe service to new applicants.

Funding: Half through Link Up America; half from rate payers.

2. Energy Utility Programs

None

AZ. WYOMING

1. Telecommunications

Link Up

Eligibility: Must be eligible for SI; AFDC; food stamps; or LIEAP.

Benefits: Reduction of installation fee by half.

Certification: Wyoming Department of Health and Human Services determines eligibility and gives applicants authorization forms for submission to company.

Outreach: Press releases; brochures.

2. **Energy Utility Programs**

None

ATTACHMENT MNC-12

EXAMPLES OF SIMILAR STATE ELIGIBILITY POLICIES

Customer Certification/Application for GTE Hawaiian Tel Lifeline Service

TO: GTE HAWAIIAN TEL
CSOC
P.O. BOX 2200
HONOLULU, HAWAII 96841

For assistance call: 643-3456
From Molokai and Lanai
call toll free: 1+800-643-3456

I hereby certify that I meet all the qualifications for Lifeline service listed below:

☐ **I am 60 years old or older** and I am enclosing a photocopy of the following as proof of age: Driver's License, State I.D., Birth Certificate or Passport

-OR-

☐ **I have a physical and/or mental impairment** and have enclosed a statement from my physician, certification from two persons other than relatives, or a completed Report of Confidential Social Security Benefit Information, that I have a handicap that qualifies for Lifeline service.

My disability substantially limits one or more of the following activities:
caring for myself
performing manual tasks
walking, seeing, hearing, speaking, breathing
learning or working

This physical or mental impairment may include but is not limited to the following diseases and conditions: orthopedic, visual, speech and hearing impairments, cerebral palsy, epilepsy, muscular dystrophy, multiple sclerosis, cancer, heart disease, diabetes, mental retardation, emotional illness and alcoholism.

-AND-

☐ I meet the following three criteria:
1. I have only one telephone line in my household
2. The address listed is my primary residence and the phone is listed in my name.
3. The total annual income of all individuals living in my household from Social Security, Pensions, Unemployment Compensation, Disability Insurance, Rent, Royalty Income, interest from Savings, Bonds etc., Wages, Salaries, Annuities, Commissions, Tips, Capital Gains, Business Proprietorships, Business Partnerships, Corporations, and Dividends, does not exceed $10,000 per year.

-OR-

☐ I meet the following four criteria:
1. I share a dwelling with others, but my phone line is not shared with those in my dwelling.
2. My phone service is listed in my name.
3. The address listed is my primary residence.
4. My total annual income from Social Security, Pensions, Unemployment Compensation, Disability Insurance, Rent, Royalty Income, interest from Savings, Bonds etc., Wages, Salaries, Annuities, Commissions, Tips, Capital Gains, Business Proprietorships, Business Partnerships, Corporations, and Dividends, does not exceed $10,000 per year.

I fully understand that GTE Hawaiian Tel reserves the right to verify any of the above statements. If I knowingly make any false statements concerning my Lifeline qualifications, I agree to pay all charges to return my service to regular rates, and to pay the difference between regular rates and Lifeline charges retroactive to the date when application was made.

CUSTOMER NAME (PLEASE PRINT)

CUSTOMER ADDRESS | CITY | ZIP CODE | CUSTOMER TELEPHONE

(CUSTOMER SIGNATURE) | DATE

☎ Application For Telephone Assistance Plan ☎

DHS-2870 (2-92)
PZ-2870-07

SECTION I: Please Complete (✍) All Information In This Section. **You need to send proof that you or your spouse are at least 65 years of age or disabled.** Examples of proof listed on back.

Name Phone Service is Under (Last, First, Middle Name): Please Print	Social Security Number (required):	Date of Birth:
Spouse's Name (if married):	Social Security Number (required):	Date of Birth:

Residence:	Apt.:	Applicant's Telephone Number (Include Area Code):	
City:	State:	Zip Code:	County:
Number of Dependent Children (under 18) who live with you:	Local Telephone Company (Not Long Distance):		

SECTION 2: Please check (✓) if you get help from any of these programs, AND send a copy of the approval letter along with proof of age (if 65 or over) or disability.

- ☐ (MA) Medical Assistance (not Medicare)
- ☐ (SSI) Supplemental Security Income
- ☐ (MSA) MN Supplemental Aid
- ☐ Energy or Fuel Assistance
- ☐ Food Stamps
- ☐ (GA) General Assistance
- ☐ AFDC
- ☐ Refugee Cash or Medical Assistance

SECTION 3: Please List (✍) All Gross Income You And Your Spouse Receive. **You must send proof of all income**, unless you get help from one of the programs listed in Section 2. (Examples for proof of income listed on back.)

(Specify if income listed is monthly or yearly)	INCOME
Social Security (include medicare premiums)	$
Disability Benefits	$
Pensions - VA, RR, PERA	$
Contract for Deed (Interest only)	$
Interest Income (checking, savings, certificates)	$
Annuities, Dividends, Royalties	$
Rental Income you receive	$
Earned Income (Wages)	$
Other (please specify) _____	$
TOTAL	$

DHS USE ONLY

Review Date:		
Eligibility Code:		
D. Entry Date:		
Staff		

SECTION 4: The above facts are true and complete, I know if I fail to send proof with my application I will be found ineligible. I have read and understand my rights and responsibilities. I know I must tell TAP within 10 days if any of this information changes. I understand that my eligibility will be reviewed periodically.

Signature Required (✍):	Date:

Minnesota Telephone Assistance Plan

What is the Telephone Assistance Plan (TAP)?

TAP is a program to lower the cost of local phone service for **elderly** or **disabled** low income persons.

Who can get it?

You or your spouse must be at least 65 years of age or disabled

and you or your spouse must be a MN resident and intend to remain;

and you must have a phone in your name or your spouse's name;

and your household cannot get help for phone service under any other state aid program;

and you and your spouse's gross yearly income must be less than the 1992 limits below.

$10,215	Single
$13,785	Married or single with a child under 18 who lives with you. Add $3,570 for each additional minor child.

If you or your spouse are at least 65 years of age **or** disabled **and** get help from any of these programs, you meet the **income limits**:

Medical Assistance (MA)	Minnesota Supplemental Aid (MSA)
General Assistance (GA)	Refugee Cash or Refugee Medical Assistance
Energy or Fuel Assistance	Supplemental Security Income (SSI)
Food Stamps	Aid to Families with Dependent Children

You must send proof of age or disability and income with your completed application or you will be found ineligible.

How much do I save?

If you qualify, you could save up to $7.00 a month on your local phone bill. You may receive the TAP credit on one phone number only.

How do I apply for a TAP discount?

Complete **both** sides of the attached application. Tear it off and mail it **with your proofs in the attached envelope** to:

Telephone Assistance Plan, 444 Lafayette Road, St. Paul, MN 55155-3859

The TAP Department will review your completed application. We will tell you and your phone company if you qualify. This may take up to 120 days. If you qualify, your phone company will credit your account. The TAP Department will also check with you once a year to see if you still qualify.

Questions? Call 612-296-2765 metro area or 1-800-657-3838 toll free for long distance.

DHS-2870 (2-92)
PZ-02870-07

Questions? Call 612-296-2765 metro area or 1-800-657-3838 toll free for long distance.

"EXAMPLES" OF PROOF FOR AGE OR DISABILITY

AGE (Send one proof if you or your spouse are at least 65 years of age)

- Birth or Baptismal Record
- Driver License
- Medicare card
- I.D. card with date of birth
- Passport
- Other

DISABILITY (Send one proof if you or your spouse are disabled and under 65 years)

- Disability payment
- Disability approval letter
- Handicapped parking permit
- Doctor's statement
- Other

"EXAMPLES" OF PROOF FOR INCOME
(Send one proof for each type of income you receive)

- Energy Assistance approval letter (call your Energy Assistance Office for copy)
- 1099 form for interest, annuities, dividends, etc.
- Bank statements for interest and/or direct deposited income
- Copy of Social Security/pension check or current approval letter
- Form SSA-1099 (yellow half sheet Social Security Administration sends at end of year)
- Form SSA-4926SM (white sheet Social Security Administration sends at beginning of year)
- W-2 Forms, wage stubs or employer statements
- Form 1040 (Federal Tax) or Form M-1PR (MN Property Tax Form)
- Amortization Schedule of Contract for Deed (for current year.)

Please send photocopies of your proofs or we will make copies of your originals and return these to you.

Please return Application and required proofs to:

MN Telephone Assistance Plan
444 Lafayette Road
Saint Paul, MN 55155-3859

This form expires 4/93. Call your local telephone company for a current application.

ARIZONA DEPARTMENT OF ECONOMIC SECURITY

COMMUNITY SERVICES ADMINISTRATION

TELEPHONE ASSISTANCE PROGRAM (TAP) CHECKSHEET

Applicant Name:_____ Application Date:_____

1. The home is wired for telephone service. Yes [ ] No [ ]
2. The household currently has telephone service Yes [ ] No [ ]
3. The telephone service has been in place 90 days or more. Yes [ ] No [ ]
4. There is a medical crisis in the household. Yes [ ] No [ ]
5. The doctor's signed statement indicates medical need. Yes [ ] No [ ]
6. The doctor's signed statement indicates medical crisis. Yes [ ] No [ ]
7. The medical need will last (check appropriate box).

   [ ] up to 1 year [ ] 2 years [ ] 3 or more years

Worker Signature:_____ Date:_____

CONFIRMATION OF MEDICAL NEED

NAME OF PATIENT: _____

ADDRESS OF PATIENT: _____

BOXED AREA IS FOR USE BY DOCTOR/DOCTOR'S OFFICE ONLY

The patient has a medical condition that would require a telephone in the household. The medical condition will require the availability of a telephone for approximately:

[ ] 1 year or less [ ] 2 years or less [ ] other (please specify)

This person has a medical crisis. [ ] Yes [ ] No

_____ _____

Print Doctor's Name *Address*

_____ _____

Doctor's Signature *Phone Number*

If you have any questions regarding this form, please call the TAP office at 542-5300 or 1-800-582-5706.

[TAPCHKST.DOC 4/92]

Your Rights and Responsibilities

Purpose: This page tells you about your rights and responsibilities if you apply for the TAP program. It tells you what to do if you have problems.

Data Privacy

Why we need the information? The Data Privacy Law states you have the right to know why we want the information from you and how we will use it. We need the information on this application to see if you can get a TAP discount. You may refuse to give us the facts we ask for, but then you won't get a TAP discount.

Who uses it? The law allows our staff, other agencies and companies to see the information. This is who can see the information:

Local Telephone Companies
County Human Service Agencies
MN. Department of Human Services
Veterans Administration
The Public Utilities Commission
Community Action Programs
Social Security Administration
MN. Department of Revenue

Your data privacy rights: You may see and have copies of most of the information in your file. You have the right to disagree if you think the information in your file is wrong. For more facts about your privacy rights, ask your TAP staff at the Minnesota Department of Human Services.

Your Responsibilities: You must inform the TAP Unit if your income increases; you move or your telephone number changes; or your marital/dependent status changes.

How to Appeal

You have the right to appeal if you do not agree with our action. You may appeal if you feel TAP did not act on your request for a discount. You may appeal within 30 days from the date you receive the notice. If you show good cause, you can appeal for up to 90 days. The State Appeals Section decides if you have good cause. You may send your appeal to:

Appeals Section
Minnesota Department of Human Services
444 Lafayette Road
St. Paul, MN 55155-3813

Your Right to Fair Treatment

We may not discriminate against you because of your color, race, national origin, religion, sex, age, marital status, political beliefs, physical, mental or emotional disability.

You may file a complaint if you feel you were treated unfairly in any way. You may send your complaint to:

State Department of Human Rights
500 Bremer Tower
7th Place and Minnesota Streets
St. Paul, MN 55101

Michigan Bell
Lifeline Application

Follow these five steps to apply for Lifeline Service:
STEP 1 Completely fill out the application. Please print in boxes below.
STEP 2 Include income information (see below). If you supply a Department of Social Services case number, you do not have to provide income information.
STEP 3 Cut off the application at the dotted line.
STEP 4 Fold top portion down.
STEP 5 Fold bottom portion up and seal to make envelope.
STEP 6 Drop in mail (postage is paid).

Please Print: Last Name* First Name Middle Initial

Address City Zip Code

Social Security Number

Department of Social Services Case Number

Phone Number (if you now have phone service in your name)
Area Code

Phone Number (to leave a message if you do not have phone service at this time)
Area Code

Please provide any or all of the following monthly income information as it applies to your household. Include income from all family members except those under 16 years of age. If you use direct deposit, a copy of a banking slip is acceptable.

Have you applied for telephone service or moved in the last 30 days? ☐ Yes ☐ No

Monthly Wages . . . . . $_____
(Attach copies of check stubs for most recent month)

Monthly Social Security Income . . . . $_____
(Enclose copy of last Social Security check)

Monthly Pension Amount . . . . . $_____
(Enclose copy of last pension check)

Other Monthly Income . . . . . $_____
(Alimony, workers compensation, enclose copies)

Total Monthly Household Income . . . $_____

Number Family Members in Household . . . . . .

Where did you pick up this Application?

Attention: Please enclose photo copies only. Originals will not be returned.

*If you already have phone service, the name on this application must be the same as the one on the phone bill.

Department of Social Services recipients only

The Michigan Department of Social Services needs your authorization to verify to Michigan Bell that you receive Social Services assistance in order to qualify for Lifeline Service. Recipient status verification will take place on your initial request and periodically thereafter for as long as you continue to receive Lifeline Service. This will be used only for the purpose of providing Lifeline Service.

All Applicants' Signatures _____ _____

(Moisten Here)

MBT-01-4LS
Revised 6-91

(Fold Up to Make Envelope)
(Moisten Here)

Michigan Bell

EN-005-1 (5-92)

ARIZONA DEPARTMENT OF ECONOMIC SECURITY
Community Services Administration

FOR DES USE ONLY
SERIAL NO. | BATCH NO.

APPLICATION FOR BENEFITS

APPLICATION DATE (1) | APPLICATION DATE (2) | APPLICATION DATE (3)

THIS APPLICATION IS FOR

☐ LIHEAP D ____ ☐ LIHEAP Supplemental D ____ ☐ Emergency Services Benefit Non Match ☐ Emergency Services Benefit-Match (EAF) ☐ URRD

☐ TAP ☐ STDP ☐ CARES ☐ APS Energy Support ☐ Weatherization ☐ Other *(Specify)*

SITE CODE	WORKER ID	COUNTY CODE	APPLICANT'S SOC. SEC. NO.	VERIFIED	APPLICANT'S NAME *(Last, First, M.I.)*
				☐ Yes ☐ No	

MAILING ADDRESS *(No., Street/P.O. Box, City, State, ZIP)*	PHONE NO.	BIRTHDATE *(MM/DD/YYYY)*	SEX	ETH. CODE*	HOMEBOUND	HANDICAPPED
			☐ M ☐ F		☐ Y ☐ N	☐ Y ☐ N

INCOME/HOUSEHOLD INFORMATION

NUMBER OF ADULTS *(Including applicant)*	NUMBER OF CHILDREN *(Under 18 years)*	NUMBER OF HOMEBOUND	NUMBER OF HANDICAPPED	NUMBER OF AMNESTY

	SOC. SEC. NO.	VERIFY	NAME *(Last, First, M.I.)*	SEX	BIRTHDATE *(MM/DD/YYYY)*	INCOME SOURCE	FREQUENCY	HOW VERIFIED	GROSS AMOUNT
APPLICANT		☐ Y ☐ N							$
		☐ Y ☐ N							$
		☐ Y ☐ N							$
		☐ Y ☐ N							$
		☐ Y ☐ N							$
		☐ Y ☐ N							$
		☐ Y ☐ N							$
		☐ Y ☐ N							$

*Ethnicity Code:
A = White, B = Black, C = American Indian, D = Hispanic, E = Asian, F = Other

MONTHLY TOTAL GROSS HOUSEHOLD INCOME | $

STATEMENT OF TRUTH/RELEASE INFORMATION

I swear and affirm that the statements made in writing or verbally regarding the facts of my household composition, [illegible]one, and all other items that pertain to my possible eligibility for any of the above programs are true and correct to the best of my knowledge. I authorize the Department of Economic Security and/or delegate agencies to [illegible]estigate my eligibility and to contact any sources necessary to establish the accuracy of information given by me which may pertain to my eligibility. Furthermore, I authorize any landlord or utility company to which payments [illegible]or credit on my behalf may be made to release information regarding my current account, including but not limited to, billing information to the State of Arizona, or its contract designee. Eligibility for this program is based on income., resources vs. expenses, and/or priority for service which may include [illegible]ders, handicapped in the household, medical condition of a household member, children in the household, referral from ex[illegible]nders office or other crisis situations. I also certify that if a member of this household had provided legalized resident status, that the necessary information on income and household members has been provided.

WORKER'S STATEMENT

I have advised the applicant of his/her right to appeal any action by the Department of Economic Security and/or delegate agency. I have also advised the applicant of any penalties for fraud and [illegible] have completed my investigation of the financial eligibility of this household as required by state and federal rules and regulations.

APPLICANT'S SIGNATURE	DATE	WORKER'S SIGNATURE	DATE

ATTACHMENT MNC-13

CROSSTABULATION OF FACTORS
AFFECTING PARTICIPATION RATES

	INDIVIDUAL CERTIFICATION	
	NO	YES
RADIO/TV ONLY	.21 (n=4)	.30 (n=1)
TV/RADIO + WRITTEN	.14 (n=5)	NA
WRITTEN/ NO TV/RADIO	.30 (n=10)	.43 (n=6)

SOURCE: AARP/CFA Analysis of FCC, Form 496 data base.

InfoServ

LIFELINE BACKGROUND

Family size	Monthly Income Less Than
1	$ 738
2	996
3	1,253
4	1,511
5	1,769
6	2,027
7	2,285
8	2,543

Lifeline is also available to households receiving any of following types of government assistance:

ADC (Aid to families with Dependent Children)
Medicaid
Food Stamps
SFA (State Family Assistance)
SDA (State Disability Assistance)

HOUSEHOLDS ELIGIBLE

Approximately 500,000 households are eligible for Lifeline in Michigan.
Approximately 100,000 households are currently receiving Lifeline assistance in Michigan.

APPLYING FOR LIFELINE

Applications are distributed by Michigan Bell and the Department of Social Services (DSS). Applicants can mail these applications to InfoServ for processing. Applications can also be initiated over the phone through a toll free number: (800) 621-8650.

ATTACHMENT MNC-14

ENROLLMENT RATES IN LIFELINE PROGRAMS

STATE	PERIOD AFTER INCEPTION (# OF MONTHS)	PERCENT OF ELIGIBLE POPULATION ENROLLED
ARKANSAS	31	9 TO 10
ARIZONA	6	9 TO 10
CALIFORNIA	12	24
	36	50
D.C.	18	51
HAWAII	8	50
NEW YORK	29	8
N. CAROLINA	4	21
OREGON	7	50
VERMONT	12	11
	18	25

SOURCES:

Leland L. Johnson, Telephone Assistance Programs for Low-Income Households: A Preliminary Assessment (Santa Monica:, Rand, February, 1988), Chapters 3 and 4.

ATTACHMENT MNC-15

ESTIMATING THE REVENUE REQUIREMENT

TOTAL HOUSEHOLDS	5,200,000
RATIO ELIGIBLE	.22
ELIGIBLE HOUSEHOLDS	1,144,000
PROGRAM PARTICIPATION RATE	.30
BELL SERVICE TERRITORY SHARE	.50
ENROLLED HOUSEHOLDS	172,000
ANNUAL DISCOUNT ($3.50x12)	$42
ANNUAL COST	$7,224,000
NEW SUBSCRIBERS (3% OF ELIGIBLE)	17,160
INCREMENTAL REVENUE	$60
TOTAL REVENUE	$1,029,000

SOURCE: SEE TEXT

ATTACHMENT MNC-16

APPROXIMATION OF INCREMENTAL USAGE COSTS
IMPOSED BY FLAT RATE SUBSCRIBERS

FLAT RATE USAGE = 95 to 142 CALLS PER MONTH

Derivation: USS usage is 47.4 per month. Ohio average usage is about 90 to 100 calls per month (NRRI).

USS USAGE = 40% EAS1 + 60% BASE

$$\$.089 = \$.142\ (x) + \$.06\ (1-x)$$
$$x = .344$$

Derivation: Data on costs in Montanye Attachment JAM-3 are available for BASE and EAS1; Data on average charges are available in OCI-177. Average charge per call is $0.89 estimated as if all calls were either EAS1 or BASE. Average EAS1 call is $.142. Average BASE call is $.06. To take account of the fact that some EAS calls are EAS2 or EAS3, EAS1 is assumed to have a 40% share.

EAS1 USE = 69% PEAK + 31% OFF-PEAK

$$.142 = .091\ (x) + .165\ (1-x)$$
$$x = .31$$

Derivation: Average charge for EAS1 peak is $.165, off-peak is $.091.

BASE USE = 66% PEAK + 34% OFF-PEAK

$$\$.06 = .037\ (x) + .072\ (1 - x)$$
$$x = .34$$

Derivation: Average charge for peak is $.072 and off-peak is $.037.

AVG. COST PER CALL = .043

Cost = .276 (EAS1, Peak)
+ .124 (EAS1, Off-peak)
+ .396 (BASE, Peak)
+ .204 (BASE, Off-peak)
= .276 (.1307) + .124 (.068)
+ .396 (.017) + .204 (.0087)
= .043

Derivation: Costs from Montanye, Attachment JAM-3.

FLAT RATE USAGE COSTS = $4.085 TO $6.106

Avg. Cost (@95 calls) = 95 (.043)

= 4.085

(@142 calls) = 142 (.043)

= 6.106

Derivation: Average usage times average cost per call.