

November 1993

**NetTrans Accounts:  
Reforming the Financial Support System  
for Universal Service in Telecommunications**

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*Comments are welcomed.*

This paper is a discussion draft. Its purpose is to solicit comments that might result in a revised proposal.

This paper has benefitted from feedback to the basic idea from the participants at the Aspen Institute's Telecommunication Policy Seminar, held August 1993, and of a follow up meeting. Special thanks go to Charles Firestone and Katharina Kopp. It also benefitted from comments at a joint conference of the Columbia Institute for Tele-Information and the Benton Foundation; Andrew Blau, Karen Menichelli, and Richard Neustadt were instrumental in that event. I benefitted from comments and help by William Adler, Russel Blau, Mark Cooper, Ron Cowles, Ellen Craig, Ron Cross, Eric Debroeck, Bruce Egan, Michael Einhorn, Robert Entman, Henry Geller, Ellen Berland Gibbs, James Graf, Karen Grossman, Frank Gumper, Dale Hatfield, John Hopley, Laurel Kamen, Gene Kimmelman, Andrew Lipman, Scott Loftesness, Sheila Mahoney, John Marks, Donald McClellan, Scott McClellan, David Moulton, Sharon Nelson, Aine Nishuilleabhain, Joel Lubin, Kelly Morman, Robert Pepper, Scott Rafferty, Steve Rifkin, Paul Schauer, Cindy Schonhaut, Gail Garfield Schwartz, Gerald Salemme, Larry Strickling, Alex Wolfson, and Don Vial.

## **NetTrans Accounts: Reforming the Financial Support System for Universal Service in Telecommunications.**

A universal telecommunications service goal, simply defined, is a public policy to spread telecommunications to most members of society, and to make available, directly or indirectly, the funds necessary. In the past this has usually been accomplished through the establishment of a monopoly system in the provision of telecommunications, with the monopolist's profits used to support some of its endusers, especially residential and rural customers. More recently, competitive inroads into most segments of telecommunications and the AT&T divestiture have limited the ability to generate the funds for such internal cross-subsidies. Since the demands for funds for maintaining universal service have not declined, the old system has been propped up in a Rube Goldberg style of mind-boggling complexity. It has tried to conduct social policy with the tools of industrial structure policy, and has been less and less successful in either. Similarly, upgrade plans for telecommunications infrastructure and local competition have been affected by the question whether some segments of society would fall behind. For the longer term, therefore, the question must be faced squarely: if we want to continue to assure the electronic interconnectivity of all members of society, how will we pay for it?<sup>1</sup> This is the subject of this paper: how to raise revenues for universal service. What to spend them on, in the present or in the future, is an equally important but quite distinct question, and is not addressed here.

Of course, competition-induces efficiency, new technology, such as radio-based local loops, and a narrower targeting of benefits are likely to reduce the magnitude of the necessary money. But these measures will not likely do away with a core of politically mandated support to rural America or to the poor. We can disagree about the magnitude involved but not that it will be nonzero, at least

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<sup>1</sup>Europeans, too, have begun to confront that question, and are addressing it in a Green Paper by the European Commission, anticipated by the end of 1993.



for the foreseeable future. Therefore the question still remains: how do we pay for the necessary subsidy? This question will not go away by the invocation of competition. Food production and distribution are highly competitive and efficient, and yet we support the food prices paid by some. We should not confuse issues of production and resource efficiencies with those of distributional allocation.

We will begin a theoretical discussion of universal service. This is followed by a section outlining today's system of financing universal service. The reader in a hurry can skip these two sections and proceed directly to the third section, in which a reform proposal is developed.

The proposal operates on the premise of neutrality -- equal rights and equal burdens to all carriers in the network system. Whether the carriers are traditional or new, they would all contribute financially to the level of universal service support decided upon by society through the political and regulatory system, on the federal and state levels, and they would have full rights to enter and compete.

The proposed system is not a transfer mechanism per se but primarily an accounting mechanism to assure a fairness of burden. The existing support system need not be scrapped (though it could be): existing contributions are simply taken into account and credited. Level playing field competition becomes possible. Customers, including those that are subsidized, would be able to choose among carriers. All carriers therefore compete for access to the subsidy mechanism by contesting all categories of customers. Competition, innovation, and universal service can coexist.

Because of its symmetry of rights and burdens, the proposed system, when presented to various interest groups for feedback, has received much support from otherwise hostile camps. They all have different reasons to support a reform. New carriers desire full rights of entry and are willing to do their part to sustain universal service; traditional local carriers recognize the inevitability of competition but want to compete on equal footing, with the burden of universal service shared;

advocates for consumers and for rural America see it as a way to preserve universal service in a competitive environment; long-distance carriers expect it to generate competitive pressures that would lower the cost of local access; many high-tech network proponents of upgrade recognize that government support for advanced applications requires politically that benefits will not be confined to an early use elite; state regulators like the flexibility to maintain or modify their existing support arrangements; and those worried about the cost of universal service like to bring competitive pressures to bear on the cost of subsidized services, and to make the total cost of universal service transparent and hence accountable. This, together with the presence of new leadership at the FCC, suggests a window of opportunity for a reform of the financing of universal service.



## I. A THEORY OF UNIVERSAL SERVICE<sup>2</sup>

### 1. Why Universal Service Policy in Telecommunications?

Universal service goals exist in every developed country. This suggests that similar benefits for a widespread interconnectivity are perceived around the world, usually independently of the political party in power.<sup>3</sup>

What is the mechanism leading to such similarity? Perhaps the best way to look at a network is as a *cost sharing arrangement* among several users. In telecommunications, fixed costs are high, marginal costs low, and a new participant C helps the incumbents A and B to lower their cost.

Subscribers will find it attractive to join a well-sized network, because the high fixed costs of the network can be shared by many, making average costs low. At the same time, the number of subscribers  $n$  adds to positive utility, because the more people can be reached, the more useful is the network. This can be seen in Figure 1, where the utility of joining a network rises at first. (The horizontal axis shows the number of network subscribers; the vertical axis depicts average cost (i.e., price) and utility, in dollars. Conversely, where the network is small, average cost is high and externalities small. In that range, below a "critical mass" point  $n_1$ , a network will not be feasible, unless subsidized by external sources. To reach  $n_1$  requires a subsidy of sorts, either by government or by the network operator's willingness to accept losses in the early growth phases of operations.<sup>4</sup>

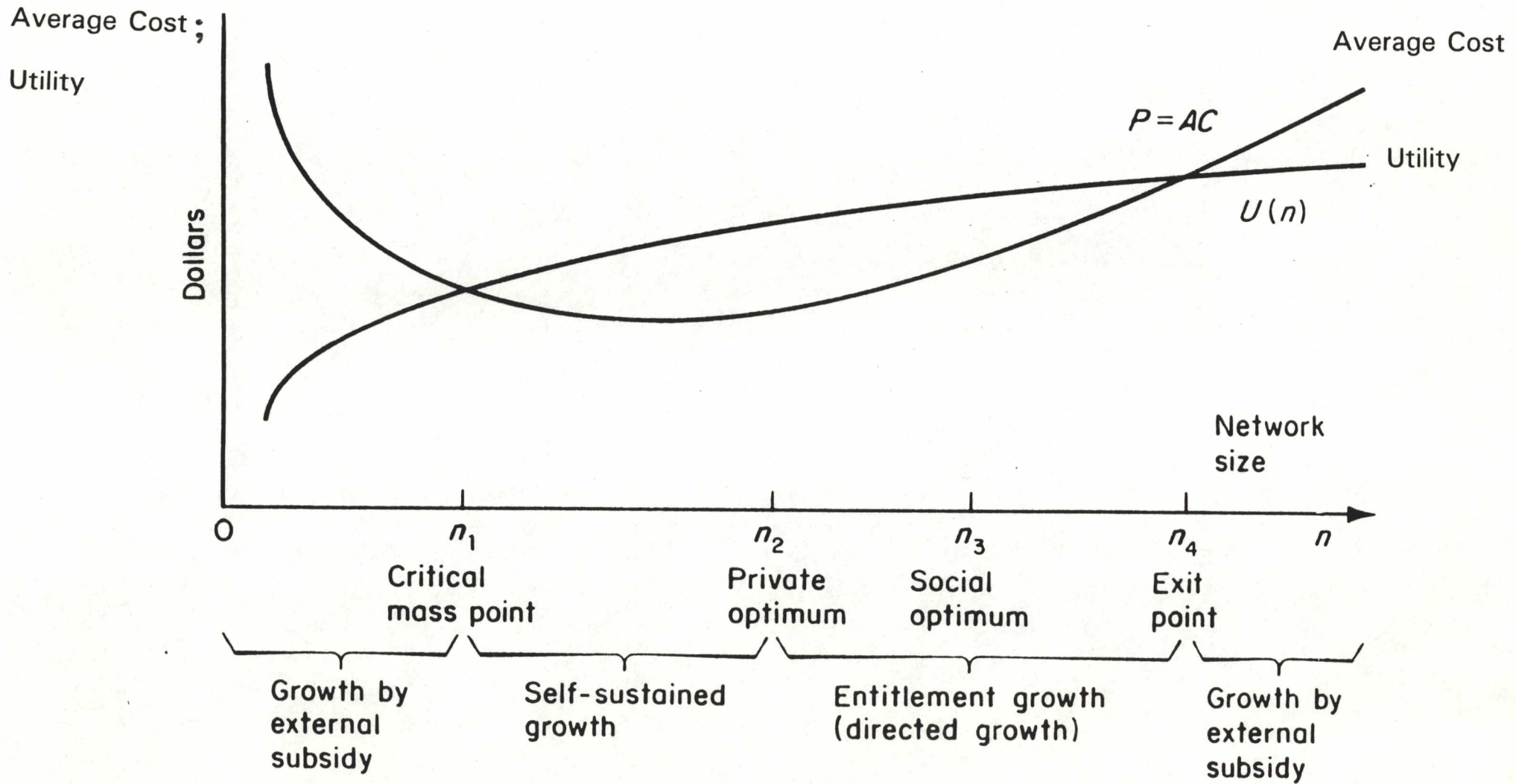
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<sup>2</sup>Noam, Eli, "A Theory for the Instability of Public Telecommunications Systems," in Cristiano Antonelli, ed., *The Economics of Information Networks*, Elsevier, 1992, pp. 107-128.

<sup>3</sup> Exceptions were some of the communist countries of old, which wanted their societies both technologically modern and politically controlled, and failed in both.

<sup>4</sup>The strategic problem is to identify in advance a situation in which such a break-even point  $n_1$  will be reached within the range  $n < N$ , where  $N$  = total population. Possibly, such a point does not exist, and subsidies would have to be permanent in order to keep the network from imploding.

FIGURE 1



But beyond that point, the network will grow on its own. Through this phase of network growth, which can be called the "cost-sharing" phase, the network users can lower their cost by adding members. However, at some point average costs increase, and utility plateaus. The optimum point is  $n_2$ . Left to themselves, the existing subscribers of the network would not accept members beyond that private optimum.

From a societal point of view, however, the optimal network size in an equal price system may diverge from the private optimum. Social welfare still increases at  $n_2$ , because the positive utility to additional network users is not considered by the existing network participants when they stop expanding at  $n_2$ . The insiders do not take the outsiders into account. If the benefits are added, the social optimum  $n_3$  lies between  $n_2$  and  $n_4$ .  $n_4$  is the point beyond which the net benefits of the network will be negative. Beyond that point the network would need again outside support to exist.

What is the implication? Left to itself and with costs equally shared the network association will cease to grow beyond  $n_2$ . The socially optimal size  $n_3$  will therefore not be reached by itself, but by some external governmental direction through required expansion, and/or by a differentiated pricing scheme, or through some internal politics of expansion.

This analysis serves to clarify the often-asked question: for which services will universal service be extended? The answer is to those services which

- (a) have reached, through self-sustained growth, a private optimum, beyond which further growth is not internally generated because *marginal* average net benefits are zero, but where
- (b) average net benefits are positive (and therefore encourage demand for entry), and
- (c) the number of those excluded is sufficiently large to lead to an opening by political means.

## **2. Political price setting, redistribution and expansion.**

We have so far assumed that universal service is something imposed externally by



government. But it can be shown that the *internal* dynamics of network members will take the network towards universal service -- and also towards its own disintegration.

As discussed, a network will cease to grow on its own after private optimum  $n_2$ . This conclusion was based on a pricing scheme of equal cost shares. Yet there is no reason why such equality of cost shares would persist if prices are allocated through a decision mechanism that permits the majority of network users to impose higher cost shares on the minority. If prices are set in such a fashion, a political majority will lower the prices to itself by raising it for others.

But with internal redistribution, several things happen. First, the minority will seek a way to exit and join in another network, provided only it is large enough to reach economies of scale that leave them better off than in the previous network where they provided the subsidies. But such "exit" would deprive the network majority of the source of its subsidy, and is therefore undesirable to it. The main way for the majority to prevent this is to try to prevent the establishment of another network.

Secondly, the network will expand beyond  $n_2$ . For the majority, there is added utility from added network members, especially if most of its cost is borne by the minority. They will therefore seek expansion. As this process of expansion takes place, the minority is growing, too. The likelihood rises that its size increases beyond the point of critical mass  $n_1$ . Eventually, the benefits of exit become strong enough, the first network "tips", and an additional network is created.

The process of unravelling of the existing network commences even earlier if a new network has the right to interconnect into the previous one, because in that case it would enjoy the externality benefits of a larger reach of interconnected subscribers, while not being subject to redistributory burden. This is the reason why interconnection has always been the main battleground between new entrants and incumbents.

### 3. Social welfare and multiple networks

But what about social welfare in such a system? The traditional fear is that the loss of some cost-sharing and externalities brought by a second network would reduce social welfare. This is not necessarily true. First, the cost curves are likely to shift downward with competition, because of greater stress on efficiency, even if economies of scale exist. More fundamentally, the welfare implications of the formation of collective consumption and production arrangements may be positive. This is something analyzed in the economics field by so-called theorists of clubs.<sup>5</sup> The club analysis, applied to networks, can show that it is generally not "Pareto-efficient" to attempt income transfer by integrating diverse groups and imposing varying cost shares according to some equity criteria. It is more efficient to allow sub-groups to develop and then re-distribute among them by imposing charges on some groups and distribute to others.<sup>6</sup> User group separation with direct transfer is more efficient than the indirect method of enforced togetherness with different cost shares. In other words, differentiated networks plus taxation (or another system of revenue shifting) is more efficient than monopoly and internal redistribution.

### 4. Conclusion

The analysis of the model shows that a network, left to itself under an equal-price system,

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<sup>5</sup> Schelling, Thomas C., Models of Segregation, Santa Monica: Rand, 1969.  
Buchanan, James M., "An Economic Theory of Clubs," *Economics*, 32: no. 125: 1-14, 1965.  
Tullock, Gordon, "Public Decisions as Public Goods," Journal of Political Economy, no. 179: no. 4: 913-918, July-Aug. 1971.  
Rothenberg, Jerome, "Inadvertent Distributional Impacts in the Provision of Public Services to Individuals" in Grieson, Ronald, ed., Public and Urban Economics, Lexington, Mass.: Lexington Books, 1976.  
Tiebout, Charles, "A Pure Theory of Local Expenditures," Journal of Political Economy, 64: no. 5: 414-424, 1956.  
McGuire, Martin, "Private Good Clubs and Public Good Clubs: Economic Models of Group Formation," Swedish Journal of Economics, 74: no. 1: 84-99, 1972.

<sup>6</sup>The set of possible utility distributions among separate groups dominates (weakly) the set of such distributions among integrated groups (McGuire, JPE, p. 124). [FULL CITE]



will be smaller than socially optimal, require a directed growth to include more participants. On the other hand, under majority-rule system of price setting, the network would expand beyond the size that would hold under rules of equal treatment of each subscriber. Such an arrangement can be stable only as long as arbitrage is prevented, as long as the minority cannot exercise political power in other ways, and, most importantly, as long as it has no choice but to stay within the restrictive network arrangement. Thus, a redistributory universal service policy leads to the need for a market structure policy.

The more successful communications policy is in terms of achieving universal service and "affordable rates," the greater its cost, its associated redistribution, and the pressures for fracture of the network. This is where we are today.

## **II. FINANCING TODAY'S UNIVERSAL SERVICE SYSTEM**

The elements of financing universal service include a multi-varied collection of contributory elements. They will be described below. It should be noted that the different segments of the communications environment -- various carriers, large users, consumer advocates, and regulators, rarely agree on financial flows, including their size, direction, or beneficiaries. Even among non-parties there is great uncertainty.

### **1. Inter-carrier transfers**

\* *Interexchange carrier access charges.* Interexchange carriers (IXCs) that interconnect into the local network must pay access charges to the local exchange companies (LECs). These charges are set by the Federal Communications Commission and the states above cost, and they relieve the LECs from part of the cost of providing local network. Average access charges are about 7 cents/minute, with about 3.5 cents for originating LEC and about 4.0



cents for the terminating LEC. The interstate access charge gets determined through complex jurisdictional separations and "Part 69" cost allocations rules on the federal level, and a similar process by the states. Historically, the system has overassigned costs to the interstate portion. In plain English, long distance rates were kept higher by regulation to keep the politically sensitive local rates low. When the old AT&T dominated both, such transfers were largely within the same firm's revenue streams. After the AT&T break-up, however, real money changed hands and the system had to be reformed. Today, overall access charges of IXC's are about \$ 20 billion. Of these, about one third represents contribution to LEC service. Access charges constitute about 20% of LEC's revenues, and about 40% of IXC's expenses. No wonder they are fought over so fiercely.

\* *High cost fund.* Fees are charged to Interstate Carriers such as AT&T and MCI. These fees provide explicit assistance to LEC's with high cost loops. All LEC costs that are 15% above the national cost average are subsidized by the "Universal Service Fund". There are limits, however, on larger companies (above 200,000 lines receiving such revenues. Also, IXC's have to pay in proportion to their pre-subscribers rather than revenues, and only IXC's with more than 0.5% of pre-subscriber lines share in payments. In consequence, AT&T's share in the fund is larger than its market share measured by revenues. The net effect is to burden AT&T more per line than companies whose customers are more traffic intensive.

The total transfer to universal service fund is about \$700 million a year, and is administered by the National Exchange Carriers' Association, NECA.

\* *Alternative Local Access Providers access, interconnection, and collocation charges.* Where local competitors are allowed (known as CAPs or ALTs), their interconnection into the LEC

networks creates several types of charges. First, the normal access charge for using the LEC networks discussion above. Second, an interconnection charge and other regulatory assessment charges for the physical aspects of interlinking, often collocated in LEC facilities. New York State sets the charge explicitly at a "contributory", i.e. above cost level to support universal service. The FCC set in its expanded special access rules an interconnection charge that is cost based, and a residual interconnection charge.

\* *Toll Pools.* Many states have pooling arrangement among LECs. The various LECs contribute their costs and long distance and access revenues into such a pool, and take out of it, after averaging, their proportion of costs. This benefits high-cost, low revenue LECs, and burdens low-cost, high revenue ones.

\* *Long Term Support ("LTS")* is a mechanism by which non-pooling LECs pay according to a formula -- the number of access lines beginning 7/94 -- voluntary Common Line pool to keep rates close to the nationwide average.

\* *Charges from cellular and radio based carriers.* These are small at present, but could grow with traffic volume.

\* *Lifeline Contributions.* In those states which have approved "Lifeline" and "Linkup" plans to support needy subscribers, LECs reduce monthly enduser subscriber line charges and installation fees. These lost revenues are compensated, through the FCC's lifeline and "link up America" programs, by the above-mentioned universal service fund pool and are thus paid for partly by the long-distance carriers. In many instances, state charges are not compensated. In 1992,

assistance for monthly service charge was available in states accounting for 72% of urban consumers, and, for connection assistance, accounting for 90% of urban consumers.<sup>7</sup>

## 2. From non-carrier service providers:

\* *Enhanced service providers pay local rates and access charges.* ESPs pricing issues are too complicated to be discussed here. Suffice it to say that LECs must offer unbundled interstate access services elements to the ESPs, known as BSEs and BSAs, and through the assessment of appropriate local supplemental service rates. BSAs have a contribution built-in. Some BSEs also have a contribution, depending on the company's plan.<sup>8</sup>

\* *Information providers.* 900-type information services are frequently charged prices that are significantly above cost.

## 3. Inter-Customer Transfers within a Carrier.

This category is not easy to distinguish from the previous category, insofar as, e.g., enhanced service providers are customers of network services. But one can view ESPs as a wholesale level of users, and distinguish them from retail customers, both business and residential, that are discussed here. The existing subsidy mechanism includes the following:

- \* Higher subscription charges on business lines than on residential lines.
- \* Above cost prices for business-oriented services such as leased lines.
- \* Above cost charges for features such as touch-tone, call forwarding, caller-ID, etc.
- \* *Averaged access charges.* Since the relative cost of an access minute for high volume users

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<sup>7</sup> Federal Communications Commission, Reference Book: Rates, Price Indexes, and Household Expenditures for Telephone Service, by Lande, James L., Washington, DC, May 1993.

<sup>8</sup> This is one area where ignorance is bliss



central in office districts tends to be lower than for low-density customers, the former pay above cost for the access charges, and therefore pay above cost for the access charges, and therefore pay more for long distance calls than otherwise.

\* *PBX customers*, through contributory PBX trunk charges.

\* *Averaged local subscription charge*. Urban and suburban subscribers tend to support rural ones.

The result has been an urban-rural price structure of substantial similarity but of independence from cost. According to FCC figures, the average rural households spent in 1991 \$601 on telephone service. Its urban counterpart spent \$621, i.e. 3% more. Rates were lowest in the Midwest (\$595 overall). See Figure 2, in the appendix. Other distributional data by the FCC are also provided in the appendix.<sup>9</sup>

One study found that a rural-urban de-averaging would lower urban customer bills by \$77 per line while they would increase for rural customers by \$316 per year. According to the study, rural service is being subsidized by \$8.7 billion to supplement its own revenues of \$22.2 billion, a contribution of 40% over customer bills.<sup>10</sup>

\* Short-haul long distance calls (intra-LATA interexchange). Support local calls and central-office to IXC - "point-of-presence".

A NYNEX study argues that for the New York Telephone Co. the major source for contribution was switched access (\$1.1 bil) and near-distance metropolitan regional calls

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<sup>9</sup> Federal Communications Commission, Reference Book: Rates, Price Indexes, and Household Expenditures for Telephone Service, by Lande, James L., Washington, DC: Federal Communications Commission, May 1993.

<sup>10</sup> Weinhaus, Carol, Sandra Makeeff and Peter Copeland et al, "Telecommunications Industries Analysis Project: What is the Price of Universal Service? Impact of Deaveraging Nationwide Urban/Rural Rates," Cambridge, MA: Telecommunications Industries Analysis Project, 1993 July 25.

(\$.5bil), and the target of new entrants. Residential exchange, it was argued, received a subsidy of \$1.4 bil. [Figure 3]<sup>11</sup>

#### 4. Carriers absorbing cost

In some instances, carriers charge below-cost prices voluntarily as part of marketing or competitive strategy or for public relations reasons. These might be absorbed either by other customers or by shareholders or competitive. Examples:

- \* AT&T provides reduced-rate services for the hearing-impaired.
- \* Cellular telephone companies offer free emergency 911 calls.

#### 5. Direct governmental contributions.

- \* Rural Electrification Administration. Provides loan guarantees to rural telephone companies.<sup>12</sup>
- \* Direct revenue contribution. In Maryland, the state provides some lifeline support from general revenue.

To conclude: we have described the elements of a contribution system which provide funding

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<sup>11</sup>These numbers are disputed by other parties.

<sup>12</sup>The Rural Electrification Division of the Department of Agriculture provides three types of loans.

1. Standard (3 subscribers or less per sq. mile): 5% interest loan.
2. Higher Interest (greater than 3 subscribers per sq. mile): 5% plus premium based on ability to pay. Local service provider must have 1.5 interest coverage ratio or better to qualify.
3. Guaranteed loans by Federal Financing Bank: Serves remainder of rural LEC's. Interest rates vary depending upon financial condition of rural LEC.

for universal service. And there are others, both explicit and implicit. Add to that a myriad state pricing and allocation arrangements. The aggregate is a system of bewildering complexity that is intelligible only to specialized financial accountants -- at best. But society at large, as well as its policy-makers, have long lost the ability to see the big picture, or to judge the present system by some criteria of fairness of efficiency, or to evaluate the cost allocations of carriers. Furthermore, the system is not becoming simpler, but more complex as it struggles to achieve the old goals without new tools. As competition increases in local and short-haul traffic, the old system comes under major strains. It has to change. But how?

### **III. FINANCING THE UNIVERSAL SERVICE SYSTEM: THE OPTIONS FOR TOMORROW.**

We showed in Section I that social benefits are derived from expanding telecommunications; that such expansion, however, accelerates tendencies to the formation of new networks; and that a funding mechanism across networks is more efficient than an internal one. In Section II we reviewed the elements of the present system of financing universal service. We will now discuss alternatives to the existing system.

#### **1. Principles for a Reformed Universal Service: Seven Neutralities and Five Friendlinesses.**

Any new type of revenue raising measure should meet the following criteria as much as possible. First, a set of seven "neutralities" that should be met or approximated.

1. *Competitive neutrality.* A new financing system should not skew the relative market strength of any carrier.



2. *Structural neutrality*<sup>13</sup>. It should not favor or disfavor integrated or unbundled provision of a service.
3. *Technological neutrality*. It should not favor any type of transmission technology over others.
4. *Applications and content neutrality*. It should not favor any particular use of telecommunications, or type of message.
5. *Geographical neutrality*. It should not burden any parts of the country disproportionately.
6. *Transitional Neutrality*. There should be no shocks or windfalls to any participants due to transition to a new system.<sup>14</sup>
7. *Jurisdictional neutrality*. The new system should be integrable into the federal-state regulatory system.

Other criteria for a successful revenue raising system are the following five "friendlinesses".

1. Political friendliness -- for acceptability, there should be no rate shocks, windfalls, or unilateral advantages to some competitors.
2. Collection friendliness -- stability in generating the targeted revenues.
3. Administrative and user friendliness. Keeping things simple is a key requirement.
4. Integrability friendliness -- existing universal service schemes need not be overturned.

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<sup>13</sup> An example how non-neutrality affects industry structure may be AT&T's recent acquisition of McCaw Cellular. According to Wall Street analysts, this deal significantly affected by AT&T's desire to reduce the access charges it is paying to LECs by establishing an alternate access route to users.

<sup>14</sup>This should not suggest a commitment to protect the status quo on prices and revenues. Such changes, e.g. price rebalancing, are possible, but are a matter for separate decisions.

## 5. Productivity friendliness -- Incentives to production efficiencies.

Realistically speaking, one does not begin with a clean slate, but must improve upon an existing institutional system. This suggests that a new system is unlikely to find approval if it entails major disruptions, major price changes, or major shifts of financial burden among companies, customer classes, industry segments, and regions of the country. To state this is merely to observe political reality. There is no implications that the present burdens and benefits are balanced, or that they should be roughly maintained.

Any plan requires also acceptability by state and local governments, which play a significant role in particular in local communications and in the maintenance of universal service schemes such as lifeline programs. The state public utility commissions have concerns over their jurisdiction, and they oppose a national uniformity that would preempt them from a traditional area of involvement. For any new system to be acceptable to the states it must leave them the flexibility to fashion their own variations, and to be able to continue maintain their state programs such as lifeline.

Local regulators are also part of the picture. They oversee cable television, where their role, minor after 1984, has been strengthened by the 1992 Cable Act. Among their concerns is to protect their source of income from the tax on cable television revenues (normally 5%). To the extent that cable operations may expand into new fields such as voice or mobile telephony, they seek the local tax to be extended to these new services, yet without their being earmarked for universal service.

## 2. Options for Reform

In structuring a system of contributions towards universal service, these are, broadly speaking, the alternatives.



1. *Protect the system of internal cross-subsidization within the major carriers.* Set regulated rates, especially on the franchised LECs, and support the low prices of universal service customers. In a competitive system, it exposes the LECs' subsidizing customers to cream-skimming entry by new entrants. It violates virtually every neutrality criterion.
2. *Expand access charges among carriers.* Impose access charges on carriers as they interconnect into the LEC local network at a contributory level. This strategy presupposes access onto "the" public network. In a multi-carrier local environment, such interconnection would not necessarily occur, and there would be uneconomic but strong incentives for carriers to avoid interconnection. The subscribers live charge, and element of the access charge system, is based on the concept of a well-defined and fixed subscriber line, whereas technology is moving toward radio-based, intelligent, variable-capacity, and portable connectivity. The access charge approach violates competitive, structural, technological, and application neutrality.
3. *Public financing: general tax revenue.* Funds to support universal service would be raised by the income tax, general sales tax, etc. This system would be the most neutral, and be as equitable as the tax which would be levied (progressive for income tax, regressive for sales tax) but in the present budget environment it is not a realistic proposition.
4. *A telecommunications sales tax.* This would be levied on customers bills of LECs and of other carriers. This system, too, would suffer from the political difficulty of raising a new tax. It would have to deal with difficult borderline issues of what and who would be included. It would not be neutral with respect to competition, structure and application. This is discussed later in section 8 of this paper.<sup>15</sup>

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<sup>15</sup>There is, at present, a 3% federal excise tax on telephone bills; the excise revenue goes into the general budget and is not earmarked.



5. *A tax on telecommunications equipment.* Such a tax would raise difficult border-line questions: would computer and TV equipment be included? On the other hand, it would be a way to reach private corporate networks. Several neutralities would be violated.

6. *Property taxes on carriers.* The advantage would be that they are fixed rather than variable costs which distorts operations the least. However, the practical problems would be serious and there would be a disincentive to investments and quality.<sup>16</sup> This might suggest a Henry George inspired land tax on carrier properties, as proposed by William Vickrey more generally. A land tax excludes improvements on the land, such as structures. But telecommunications is not a particularly land-owning industry, so the tax on it would have to be enormous, and it would distort technology choice and inter-carrier competition.

7. *A comprehensive telecommunications value-added tax.* Such a telecom-VAT would be levied on all carriers, services (including enhanced services, equipment, etc.). It would be the most neutral of all telecommunications-specific levies, but it would raise the political problem of a new tax, plus border drawing questions and enhanced service coverage issues that will be discussed below.

8. *A net transmission account system* of debits proportional to the transmission revenue, net of payments made to other carriers, and with credits for universal service contributions made otherwise. We call this the NetTrans Account system. It is the recommended system, and we will develop its elements below.

### **3. The Value-Added Approach**

We will begin by discussing the concept of value added tax. We will analyze its advantage,

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<sup>16</sup>Einhorn, Michael A., *Recovering Network Subsidies Without Distortion*, Antitrust Division U.S. Department of Justice.

but also its disadvantages when applied to telecommunications. This will lead to the next step, the development of a telecommunication-specific revenue-raising system that draws on VAT principles.

A value added tax (VAT) is a form of a general sales tax. In contrast to a sales tax, however, it is neutral with respect to the nature of internal integration. With a sales tax, a company pays taxes on inputs, and these inputs in turn may include tax payments on *their* inputs. It is therefore advantageous to integrate as many operations as possible within the same entity. A VAT, in contrast, gives credit for tax payments made earlier in the chain of production and distribution. It is therefore proportional to the "value added" by each producer of goods and services, with a constant tax rate imposed at each stage on the sales revenues net of purchases.

The VAT can be imposed on either buyers or sellers. There is no economic difference, since the actual burden -- the economic incidence -- of any type of sales tax is not based on the nominal payor but on the relative demand and supply elasticities of consumers, producers, workers, and suppliers of capital.<sup>17</sup>

Invariably, a VAT is seen as a broad-based, general tax. In Europe, it covers virtually all forms of consumption. In the United States, it has been proposed as a form of federal sales tax, with the potential to be a huge revenue generator. Just to get the order of magnitudes, a VAT at the average European rate of 17.5% would be about a 17.5% tax on the GNP, or about \$1.1 trillion dollars of revenues!

As a general tax, a proposed VAT is embroiled in at least two major debates. First is the question of new taxation, which has tormented recent Administrations. Second is the comparison to

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<sup>17</sup> See Ernest S. Christian Jr., "If, When You Say "Value-added Tax," You Mean...", in Weidenbaum, Murray L., Raboy, David G. and Christian, Ernest S., editors. *The Value Added Tax: Orthodoxy and New Thinking*. Mass: Kluwer Academic Publishers, 1989.



other forms of general taxes, in particular the income tax or the expenditure tax.<sup>18</sup> Whereas these can be set at progressive marginal rates, permitting a higher proportional taxation of high income individuals, a VAT is basically proportional to consumption.<sup>19</sup> Since consumption declines as a proportion as income goes up, a consumption based tax will tend to be regressive. This has therefore led to a one-two punch against the idea of a value added tax: conservatives don't like taxes, and liberals don't like regressivity. Yet it is essential to differentiate. That is part of policy analysis. Let us therefore explain why a VAT on telecommunications is different from a general VAT.

1. A VAT on telecommunications would not be an *additional* tax, but a *substitute* for the existing internal system of de-facto taxation of some customers to support other customers, a system that stands in the way of competition and hence of deregulation. It can be calibrated so as not to be higher in the aggregate than the system that would be replaced. Conservatives should appreciate this.

2. A VAT on telecommunications is a way to let a system of subsidies survive even while competition takes place. True, raising the funds by way of a general income tax would be more progressive, but is not likely to be politically achievable. Second, the distribution of the revenue would almost certainly be progressive, and hence the net effect of the VAT/universal service should be progressive. Indeed, one study of VAT around the world concludes that electricity and telecommunications services should not be exempt from a general VAT, in

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<sup>18</sup> Not to be confused with a sales tax. An expenditure tax is basically a tax on income minus investments, and can be progressive.

<sup>19</sup>Progressivity in the actual incidence of the tax could exist if demand and supply elasticities shift the tax to suppliers of capital and sellers of goods and services, and assuming that those are higher income.



order to *protect* progressivity.<sup>20</sup> The opposite case is made for ensuring that electricity and telecom are not exempt from VAT. Liberals as well as supporters of rural America should appreciate this.

3. By making the subsidy system transparent, in both the taxation and allocation aspects, it would make the system politically more accountable, less manipulable, and more susceptible to a targeting to the highest needs and greatest benefit. And it would distribute burdens equally. Good government advocates should appreciate this.

As mentioned, VATs are normally levied against all transactions in the economy. There are some exceptions, typically for food, medicine, housing, or public transportation. Small firms are sometimes exempted, as are classes of commodities that are difficult to tax or hard to resist politically, such as financial services and owner-occupied housing.<sup>21</sup> Newspapers, too, are often exempt. (Much of these exceptions are fictitious, since the cost of the products and services embody VAT taxes paid by the earlier contributors in the chain.) Telecommunications were mostly exempt as government services; more recently, those that have been "corporatized" have begun to pay VAT. There are no examples known to us of any sectoral VAT, or of a telecom VAT. The reasons are those of line-drawing -- what is inside and what is outside the sector -- and the distortion that are caused by a sectoral tax. These problems are real, but again, if applied to a telecommunications VAT, one must recognize that a distortive system already exists; that the policy goal of universal service will persist; and that the resort to a general tax revenue is politically not realistic. Hence, a sectoral

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<sup>20</sup> Tait, Alan A., Value Added Tax: International Practice and Problems, Washington, DC: IMF, 1988

<sup>21</sup>Tait, Alan A. Value Added Tax: International Practice and Problems, Wash. DC: IMF, 1988, p. 68.

VAT-like measure can be a great improvement over the present system. Let not be the quest for the perfect lead us to reject the good.

Given the advantages of the value added charge concept in terms of the seven neutralities, we should try to maintain as much of it as possible within a telecommunications specific framework.<sup>22</sup> We will therefore use the VAT concept as a starting point, and fashion a telecommunications-specific application. We will proceed to describe the proposed new system, entitled the "**Net Transmission Account System**" or NetTrans Accounts.

#### IV. THE NET-TRANS ACCOUNT SYSTEM

At their most basic, NetTrans Accounts are not primarily a new form of *transferring* money. They are rather a way of *keeping score* that all carriers pay a proportionately similar share to the maintenance of that type of universal service which the political process has decided upon. Only insofar as some carriers may be contributing less than others would the NetTrans accounting result in transfers to and from the accounts. This system also means, importantly, that one need not (though one could) eliminate or change existing contribution programs. They are simply taken into account and credited in the process.

The system would be initiated at the same time that local competition would be fully permitted, with full interconnection and collocation rights.<sup>23</sup> It would also be tied in with a cost-reduction mechanism of competition, as explained below, so that inefficient carriers could not shift their costs to more efficient ones.

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<sup>22</sup> A major advantage of most forms of taxes on the telecommunications sector is that demand is fairly inelastic. In consequence, any charge against it would not distort consumption decisions much. This conforms to one of the major desirable attributes of an ideal tax.

<sup>23</sup>It should be noted that where local competitors are still restricted in some fashion, their revenues and hence their contribution would be small. In that sense the system is self-correcting.



The system in a nutshell:

**In an independently administered universal service account, carriers are debited a flat percentage of their transmission path revenues, net of transmission charges paid to other carriers, and given credit for universal service contributions made and for subsidized users choosing its service.**

The elements of this plan are now developed stepwise.

### 1. "Carriers"

a. *Who and what is included in the system?* Entities that provide "transmission path" services to third parties for compensation. Included are all facilities-based two-way transmission carriers with an FCC carrier identification code (CIC) that are subject to the FCC's Title II regulation (or its state equivalents), including LECs, IXCs, cellular carriers, CAPs, and private microwave and satellite carriers.

Excluded are enhanced service providers (ESPs), Information Providers (IPs), resellers, intraorganizational private networks, equipment manufacturers, and cable and broadcast operators (except for their two-way telecommunications transmission services). This will be explained below.

b. *Telecommunications hardware?* In the old days of AT&T it would have been easy to include telecommunications equipment. Today, however, such hardware is widely user-owned, and has been merging with computer and video equipment, and with consumer electronic devices. To levy a charge on telecommunications equipment therefore would either require continuous line drawing problems, or it would reach far into the computer and video industries. This would likely be politically unpalatable, and would go far beyond the goal of reorganizing the existing subsidy system *within* the telecommunications sector. For those reasons, equipment should not be included in



NetTrans accounts system. (At the same time, the cost of buying hardware is not deductible for purposes of calculating the net transmission path revenue. This will be discussed below.)

c. *Upper level, enhanced, and information services?* To include these types of services would create major problems. It could be considered a levy on information and speech (voice, text, image, and video) and as such constitutionally suspect (*Minneapolis Star and Tribune vs Minnesota Commissioner of Revenue*. 460 USS75 (1983)). It would greatly increase the number of entities subject to the account system and thus increase its complexity. And it would lead to complicated questions of what is counted as enhanced services revenues. For example, if a travel agency provides an on-line reservation ticket purchasing service, without a charge, i.e. paid for through the ticketing commission, what is the ESP revenue it would be liable for? Or, how would an AIDS hotline that is funded by a government grant be treated? Should there be exemptions for non-profit and charitable organizations? Would a teenager's computer bulletin board system be subject to periodic filing? These questions can be resolved, but should one bother? One can reach all of these activities much easier indirectly. They all use underlying telecommunications transmission, and thus a charge on such transmission would be passed on to them under normal circumstances. This assumes a relative inelasticity of demand for transmission services, which is a reasonable assumption given that the charge would be on all forms of transmission and could thus not be avoided by switching transmission modes. What would be free of the charges would be the ESP's own value added. To omit it creates a bit of a distortion, but it also reduces an opposite distortion to equipment, which can provide many of the functions of ESP services, and which would be exempt, as has been argued above.

d. *Intra-organizational private networks?* Intraorganizational networks are an important part of American telecommunications environment. They come in two basic types: 1) using their own physical transmission facilities, i.e. privately-owned and used transmission facilities, or 2) using the transmission facilities of outside carriers, either a) dedicated leased lines or b) with "virtual" use of

the carriers' network. In each case, it would be difficult to impute a revenue measure to the private network, since it serves the firm, (and sometimes its suppliers and customers) internally, rather than an explicit market price. Even where such a charge is made for internal accounting purposes, it could be significantly manipulated in order to reduce the NetTrans charge. In addition, there are the same problems that were mentioned for ESPs: large number of entities, administrative problems, definitional problem, and the need for fundamental legislation if system is widened.

In consequence, such private networks might be treated similarly to ESPs or resellers, which they frequently resemble. Where they use other carriers' facilities, they would contribute indirectly through the charges levied against the carrier facilities. Their demand elasticity is likely such that they would be subject to the charge's incidence. The main problem is where private networks use their own facilities. Including them is administratively difficult; excluding them creates a distortion in favor of facilities ownership. On the whole, it seems simpler to exclude them from the NetTrans account system than to include. Yet this does not mean that one needs to exclude them altogether from other forms of contribution to universal service, if such is desired. For example, today such networks are charged above cost for PBX trunk interconnection to the network. Such mechanisms could be maintained in the future, if desired.

e. *Resellers?* Pure resellers are poised between transmission carriers and enhanced service providers. On balance, it seems easiest to exclude them from the NetTrans system, and instead reach them indirectly through the charge on the underlying transmission services which they resell. This also avoids the sticky problem how to differentiate resale from enhanced services. Where resellers are not "pure" and provide basic switching functions in addition to their transmission resell, such switching service would be subject to Net Trans.

f. *Cable television operators, broadcasters, direct broadcast satellites, wireless cable?*

Traditionally, what can be broadly called the mass media have not been part of the support system for



universal service in telephony. To include them now would therefore change things negatively for them, which would translate into political problems. Furthermore, they are mostly one-way rather than two-way carriers. Also, the charge would have to be limited to the transmission function of such media, in order to be symmetric to the exclusion of ESPs and IPs discussed above, and in order to avoid establishing an unconstitutional burden on information and speech. Yet it is difficult to separate or impute transmission revenues in these media. Broadcasters or cable operators do not charge themselves transmission fees; cable operators often pay for program providers to use their facilities, rather than the other way around. In other instances, they must provide channels for free (public access; must-carry channel); in some cases they are paid (leased access), but the amount is a trivial part of overall revenues. Most revenues are derived from consumers paying for basic and premium program packages or per-view events. It is conceptually difficult, to say the least, to differentiate between revenues for transmission, programs, and advertising. This would argue for an exemption from NetTrans account.

A more fundamental point is that one cannot burden cable operators while assigning the revenues to the customers of other carriers. One cannot burden the customers of one service without also providing a benefit to some of them, too. Hence, the inclusion of cable operators in the system would mean that cable television provision itself would become subject to a universal service requirement, i.e. the policy that all Americans be accessed by cable at affordable rates, and, if necessary, be subsidized. This would be a policy that goes much further than the present approach, and its establishment would require a political mandate.

It is a different matter if these media enter telecommunications-like services. Cable operators, for example, are poised to offer voice, data, and mobile services. Time Warner's state-of-the-art trial in Orlando, Florida, will include switched long distance voice service. Other cable companies are owners of LECs, of CAPs (competitive Access Providers), or of mobile service providers. It would

be difficult to explain why such services should not be included. Nor should it be too difficult to measure their revenue, since presumably customers would be charged for the services. And where a cable company bundles such services within a larger service package, it would have to unbundle, both for reasons of communications policy and in its own self-interest if it want to avoid a charge on otherwise excluded revenues.

A related question is whether a DBS satellite providing transmission services for broadcasters should be included. Here, the test would be whether the transmission service is for a two-way service subject to Title II regulation, or whether it is a mass media service subject to Title III. The distinction may be difficult to maintain for carrier transmission for a future interactive television, but let's cross that bridge when we come to it.

g. *Paging companies?* One-way paging services would be excluded.

h. *Rights of way providers?* In most cases, a transmission requires rights of way, even for micro-wave or satellite based services. To incorporate every landlord, however, would be far too complicated. The NetTrans account system would be limited to actual carriers engaged in the electronic and photonic aspects of telecommunications. These carriers could not subtract payments to rights of way owners from their gross revenues. In the setting of the price for the right-of-way the NetTrans debit charge would, presumably, lead to somewhat lower market prices for rights of way, because, on the margin, demand for transmission is affected. Hence, the owners of such rights of way would indirectly also contribute to the system.

i. *Software providers?* Software and hardware are partly substitutes. Software is also difficult to separate from enhanced services and information services. It should be excluded.

Having now excluded a large number of participants, who is included, specifically?

a. Traditional local exchange companies (LECs), both Bell Operating Companies (BOCs) and



independent LECs.

- b. Competitive Access Providers (CAPs)
- c. Interexchange carriers, both AT&T and "other common carriers (OCCs)
- d. Cellular carriers, both wireline and independent.
- e. Trunk-line providers, such as highway authorities, railroads, electric utilities.<sup>24</sup>
- f. International record carriers owning their own facilities
- g. Carriers' operating their own facilities, such as submarine cable consortia and satellite operators.<sup>25</sup>
- h. Cable television operators offering two-way telecommunications services
- i. Private radio and microwave operators offering two-way services to other parties
- j. Satellite carriers serving non-broadcast users.
- k. For the treatment of foreign carriers, see the discussion in the jurisdictional section below.

Also exempt could be start-up carriers or new operations within these categories, partly as a form of "infant-industry" assistance, and partly to reduce the administrative burden by including only carriers who seem to survive. Such exemption should be limited in duration, for example to three years.

## 2. "Transmission path revenues".

How would these carriers be treated under NetTrans account system? Proportional allocation of the burden of universal service could be accomplished by using various criteria, such as number of access lines, number of customers, or message units. All suffer from problems. Message units are

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<sup>24</sup>Only for transmission services, i.e. electronic or photonic transport etc, but not for the rights of way.

<sup>25</sup>See discussion of international service below.

not relevant in high capacity lines and where rates are not usage-sensitive. Access lines are relevant primarily for LECs, but not for other carriers. Nor could it be used in situations in which a customer utilizes multiple carriers, as would be the case with a "least-cost-routing." And the number of customers would be skewed in favor of carriers serving a few large accounts. One the whole, revenues are a good proxy for economic activity. The revenue numbers are also available for the traditional carriers as a byproduct of the regulatory process. Furthermore, if new carriers were to be stymied in entering the market, their revenues and thus the NetTrans obligations would be small. In consequence, for NetTrans accounting, the transmission path revenues of a carrier would be chargeable, net of payments made to other carriers who are subject to the system. Transmission path means transport plus basic switching. Conceptually, it is the technical network utilized to get information from network interface A to network interface B. This would omit all types of services by service providers already excluded above such as enhanced services; information services; paging; resale; one-way services; equipment; or software. Also excluded would be miscellaneous non-transmission path services such as directory assistance; billing and collection services; special features such as caller-ID, or call-forwarding.

What would be included:

- local message unit revenues
- intra-LATA toll revenues
- inter-LATA toll revenues
- mobile telephone revenues
- monthly telephone subscription charges, excluding extra software features such as call-waiting, or caller-ID.
- access, interconnection, and collocation payments received



- payments received from resellers
- dedicated circuits and high-capacity business services
- "virtual" services
- transmission services for information providers, including video dial tone.
- packet switched transmission services
- transmission parts of integrated systems packages
- basic Centrex services
- Central Office switching functions

To separate these revenues from the others received by LECs might not be easy under normal circumstances. But the NetTrans account system benefit from the already existing requirement on the LECs to conduct such separation. In a series of lengthy and complex proceedings (*Computer I, II, and III*) the FCC has already established such separations, and NetTrans would piggy-back on the accounting system established, which requires a separation of revenues for "basic" and for "enhanced" services.

There is a question whether to include Centrex and switching services. On the one hand, since equipment is being excluded, and with it PBXs -- a close Centrex substitute -- Centrex would be disadvantaged if its revenues were subject to a debit account. On the other hand, Centrex is close to general switching, and indeed takes place within the same central office equipment, so that its exclusion would logically require the exclusion of switching, too. Yet basic switching is an integral part of the transmission path. In the case of packet switching, it is even difficult to separate transmission from switching functions. Also, customers do not tend to pay separately for transmission and switching, but for a transmission path from point A to point B. (This could be changed in the under an unbundling of charges). LECs charge under Open Network Architecture arrangements for unbundled "Basic Serving Arrangements" or BSAs, which includes loop and switching, and such

BSAs may be the appropriate definition for the loop-central office path of a transmission, i.e., switching revenues and the relevant unbundled centrex charges would be included in transmission path revenues.<sup>26</sup>

A related question is what among the several central office functions to include, and what to exclude. Here, fortunately, the Open Network Architecture process of the FCC and by several of the states<sup>27</sup> has provided the groundwork for the NetTrans account system separation. In these proceedings, the RBOCs unbundled their central office functions into several Basic Servicing Arrangements (BSAs) and specialized Basic Service Elements (BSEs). This framework can be adapted for the NetTrans accounts, simply by including BSAs and excluding BSEs. (This, incidentally, would also serve as a check against RBOCs incentives to excessively expand the BSAs, which they control.)

The other carriers would be treated along the same principles as the LECs, in order to be consistent. The disadvantage here is that their internal accounting system, in contrast to the larger LECs which have been required to do so for some time, may not be geared up to the task of identifying transmission path revenues within the larger company revenues. To institute such a system might therefore be a burden for some types of carriers. Where such is the case, the introduction of the system to the particular carrier category might be delayed a bit to provide extra time for the accounting system to be set into place, and to provide through the delay also some

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<sup>26</sup> At the same time, enhanced Centrex functionalities would be excluded, as they are ESP type services.

<sup>27</sup> See Federal Communications Commission, In the Matter of Filing and Review of Open Network Architecture Plans, Memorandum Opinion and Order, FCC 88-381, CC Docket No. 88-2 (Phase I)(Adopted November 17, 1988; release December 22, 1988); New York Public Service Commission (NYPSC). Case 88-C-004, *Order Instituting Procedures for the Implementation of Open Network Architecture*, New York: NYPSC. September 29, 1988; and Eli Noam, *From Liberalization to Open Networks: A Review of Open Network Architecture and the Evolution of Telecommunications Policy in the United States*, Columbia Institute for Tele-Information Working Paper Series, 1992.



compensation for the changeover costs. It should be kept in mind that all carriers would have an incentive to establish an accounting system that provides them with the desirable exclusions.

### **3. "Net of payments made to other carriers who are part of the system".**

An important feature of the NetTrans account system, gleaned from the value added tax concept, is to give credit for the cost of inputs. In this case, those are transmission path inputs purchased by a carrier from other carriers. For example, long-distance or mobile carrier reaches its customers, or its customers' called parties, through local exchange companies. It pays for such access through access charges. The carrier's own transmission path value-added are its transmission path revenues minus payments for such services to other carriers. This feature of the plan means that there is no accumulation of tax upon tax, as would be the case with a sales tax imposed at each stage. In consequence, there are no advantages to being vertically integrated across multiple stages.

The logic of subtracting input payments is to avoid multiple payments. But if that input is exempt from payment, there is no reason for a subtraction. For example, if the interconnected carrier is a foreign government monopoly carrier from which no NetTrans payment may be obtainable, then payments to such a carrier should not be subtractable. Similarly, a carrier's use of other ESPs' services, or its equipment input purchases, are not deductible, since these firms do not contribute to NetTrans.

### **4. "Flat Percentage."**

With these steps, we can define and estimate a revenue base for the charging account mechanism. If we know how much of a universal service contribution we must generate in total, we can calculate a debit percentage. That percentage rate, applied to any carrier's net transmission path revenues, would then be its debit in its NetTrans account. The percentage would have to be

periodically recalculated to keep from over- or underrecovery. In calculating the amount of overall universal service burden, there needs to be a mechanism to keep costs declining. This will be elaborated below.

#### 5. "Independently Administered."

For the account system to operate equitably and without suspicion, it could not be administered by any particular industry group, or else it may shift its costs to its rivals. The alternatives are:

- a. *A government agency, such as the FCC.* This would probably stretch the agency too thin, and in matters of revenue accounting rather than policy and regulation. The FCC should supervise, however, any entity that administers the system.
- b. *A respected accounting firm with experience in telecommunications.* This is probably the fastest start-up option. However, it would require supervision and selection, and it should be monitored by the FCC.
- c. *A new inter-industry entity* governed by a board comprising all industry segments, including large users, as well as representatives of the public. Such a group would subcontract with other entities such as accounting or consulting firms for the actual operations. Emphasis would be given to keep this entity small.

The account system administrator would verify and check a carrier's debit calculation. It would also credit for a carrier's other contributions to universal service during that period. We will now turn to that aspect of the plan.

#### 6. "Credit for Universal Service Contributions Made."



At present, carriers contribute to universal service in a variety of ways. Some pay access charges that are substantially above cost. Others serve rural areas at prices that are below cost. Etc. These contributions should be credited against the universal service fund debit.

One major advantage of the NetTrans account system is that it does not force an already existing subsidy mechanism to change. Nor is it dependent on such a change. A rebalancing of rates could take place, but one need not wait for it, because NetTrans can accommodate either situation. What it does is to credit all these programs within a general calculation of share of burden. If access charges, toll pools or lifeline contributions have already been made by a carrier, they are taken into account, to the point that high burdens through other contribution programs will lead to net repayment. If the present hodge-podge of contribution programs should, by some miracle, be perfectly equitable in its net financial burdens on the various carriers, no additional transfers at all would have to take place.

To extend credit will require quantification. One simple way to establish the credit is to let the various carriers declare their valuation of their own contribution. One might think that this will lead to an overestimate. But if the estimate would be the minimum debit for the next period, adjusted for growth, the incentive to exaggerate would be reduced. Another method would be to evaluate the contribution. The incremental difficulty of this task should not be overestimated, in that the LECs, for a very long time, have gone through state rate cases and federal proceedings in which they have argued the extent of their various contribution to universal service. Similarly, other parties had the time to develop significant expertise in dissecting some of these numbers. Regulators, in turn, had ample opportunity to reach some conclusions, determine cost allocations, etc. Thus, this experience and numbers would be used for purposes of credit. In the future, this might be a task where the experience of state regulatory commissions would be useful, operating under broad FCC principles, and with some averaging to even out jurisdictional quirks.

One should not try to make the crediting system perfect, or else it will be overly complex.

Its elements should include:

- a. An allowance for an average urban and suburban residential service subsidy per line, based on some formula or average of cost (subject to an annual productivity improvement factor to provide incentives for greater efficiency, such as an already existing general price cap mechanism), minus price of service. Where competition exists, this cost could not exceed the price of rivals in the same market.
- b. A similar allowance for low-density areas
- c. The contribution element of access, interconnection, and collocation charges, also subject to a productivity improvement factor, and competitive access prices by rivals.
- d. High-cost fund payments
- e. Net contributions to toll pools
- f. Clearly accountable net contributions to lifeline service, hearing impaired relay system, and similar programs, also subject to productivity factors

Today, a regulated carrier's contribution to universal service tends to be offset by regulated prices for other services and customers that are above cost. Thus, the contribution may be substantial, while the net contribution is zero. How would this be handled? This would be easy in the long-term; the open entry into all aspects of local service should eliminate regulated above-cost prices and high-profit services. Therefore, contributions to universal service by providing residential services below cost would not be offset by regulated high profit services.

But in the short term, market power still exists, and an LEC left to its own devices would not reduce below a monopolistic price. In consequence any payments a price-regulated carrier obtains



from the NetTrans account would have to be flowed through to price reductions of profit-making contributory price-regulated services. In such a way a carrier would not be over-credited. Where the flow-through is partial only, the NetTrans credit would be reduced correspondingly.

One question is how to handle the problem of "stranded investment," i.e. of LEC investments that become economically or technically obsolete due to the competitive entity. Here, one needs to differentiate between "new" stranded investment and "old" one. If new investments become worthless, investors bear the burden, as in any industry. Earlier investments, however, were undertaken within a context of assured but lower returns for a specified period, and were approved by regulators. LECs have a choice: they can either write down the value of the investment and thereby lower their cost. Their competitive position improves, but shareholders bear the loss of investment value. Or the LECs can keep cost at the original level but thereby provide an added incentive for competitors to enter. The average cost per remaining subscriber could well rise (before productivity gains), but this cost would be partly borne by other carriers through the NetTrans system insofar as the subsidy amount is based on the average cost-price gap. In any event, stranded investment is probably not going to be of major magnitude if the experience from other types of competition is a guide.

#### **7. "Credit ... For Subsidized Users Choosing Its Service"**

The administrating body verifies a carrier's calculation of its net account debit. It then collects the amount due, or reimburses a carrier which has a net positive balance. At the end of an accounting period, a true-up takes place. The accounting system is used in accordance with the relevant universal service laws and regulations, and carriers and/or users receive credits to support telephone or other services, whether traditional or new. It is not the task of this paper to analyze what types of services might be supported, for how long, what kinds of users might benefit, and whether support ought to be broadbased and expansionary or narrow and means-tested. The mechanism could

be used for upgrading of the communications infrastructure, if such is decided upon, for each purpose, even to support a NetTrans mechanism that is a content-neutral that can support any plan. One way to proceed, after defining the benefitted class of users and services, is to provide these users with "virtual vouchers". They would choose carriers freely; they would know the amount of the subsidy voucher, and shop around to make it go furthest. The chosen carrier would then be credited in its NetTrans account for the value of the voucher. The customers' telephone could reflect the credit, which would be fully passed on to them. Such a system would be much simpler to administer than millions of actual vouchers that would have to be sent out and collected.<sup>28</sup>

#### **8. A Sales Tax?**

Could this system be accomplished similarly through a special sales tax on telecommunications? As has been argued above, a sales tax at each stage of telecommunications inputs would accumulate across stages, and thus be distortive, without being much simpler. Another alternative would be to institute a single-stage sales tax, collected only at the enduser level. But here are its problems:

- a. Who is an enduser? Is it an ESP, or its customers? Many entities use telecommunications services as an input to more complex services offered to other users further down the line. A system of exclusions would have to be devised. Given the large number of user entities, this would be complex.
- b. What kinds of services are taxable to the enduser? On-line data bases? Caller-ID? Videotex? Interactive television? Hardware and software? Here, too, a system of exemptions

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<sup>28</sup> See also Gail Garfield Schwartz, "Universal Service Assurance Via Equal Access to the Subsidies." Thinking points by the Teleport Communications Group. September 21, 1993.



would be required. Otherwise, the same services offered by non-carriers would also have to be reached if neutrality among competitors is to be preserved.

- c. Perhaps most important: A sales tax inclusion would be a new and additional tax, and would not offer credit for existing contributions to universal service by a carrier and its customers. How will a sales tax incorporate the present contribution mechanisms? For example, the customers of long distance carriers make already a contribution through access charge mechanism. The sales tax would be, in effect, a double tax, and in fact a tax upon a tax. How would the system establish equity and neutrality? If the sales tax mechanism does not give credit for universal service contributions made by some carriers, would these contribution systems have to be first scrapped in 52 jurisdictions?
- d. In what ways would such a tax make competitive entry possible? How would it provide choice to customers?
- e. What are the incentives of a sales tax to improve productivity?
- f. Could such a sales tax be enacted in the present political environment?

All of these questions can be resolved. But when they are, the result is not a sales tax, but probably something very much like the proposed NetTrans account system, only more complex.

## **9. Jurisdictional Issues.**

### **a. State Jurisdiction**

One question to consider is the role of the state public utility commissions in this system. On the one extreme, if the system is entirely state-based, it would be unworkable, because each state would have to calculate its own transmission path revenues and universal service costs. Carriers would shift operations, or at least accounting costs and revenues,

according to which state offers a lower rate. The result would be a "race to the bottom" by states to attract telecommunications carriers, and inefficient operations by carriers chasing the lowest rate. The other extreme, total federal and uniform rules, is also unpalatable. This suggests a mixed system. Federal guidelines would establish a national system. States would have a role in the implementation, as well as could have variation on the benefits side. The states' considerable expertise in calculating the cost of universal service in their region has already been alluded to. Furthermore, the states might also have different priorities. Some might wish more generous support mechanisms for rural users; others would want to be more supportive of the cities and the poor.

States could establish, for example, more or less generous universal service policies, as they can today. The credit mechanism would have to have state caps so as not to permit any state to be generous at the expense of the other states. To include the states is not only good policy, it is also good politics, and it is squarely in the tradition of American federalism.

#### b. International

Moving into the other direction in the spectrum of jurisdiction, how should international transmission services be handled? The principle of contribution for transmissions services should also include international services. These have in the past contributed heavily to universal service, so why exempt them now? To apply this principle would mean that, e.g., if Sprint would bill for an international call, it would be liable for a charge against the revenues from that call, net of payments to other U.S. carriers. Revenues due to them under the international settlements system would be subject to a U.S. NetTrans charge before it would be paid out by a U.S. carrier. That carrier could not subtract payments to foreign carriers, unless these participated in NetTrans. The latter would be appropriate, given that



they are but the last link in a chain of communications initiated in the US, and that all US carriers are treated in the same fashion than their foreign correspondents would be. What such a system then might do is to right at least partly the present inequity in the international system of settlements, where US carriers must send vastly more dollars abroad to foreign government monopoly carriers which are under little pressure to lower international telephone rates, and which thus use American carriers and their customers to support their own universal service.

For incoming international calls initiated by foreign callers and carriers and terminated by U.S. carriers, the principle should be to charge the amount received by the US carrier for its transmission service. The foreign correspondent carrier would be treated like any other customer generating traffic. International consortia such as Intelsat, Inmarsat, or the submarine cable consortia would either pay a contribution, or the US carrier using them could not subtract payments to them.

#### c. Congress

An important question is whether the new system would be a tax subject to Congressional tax legislation, and whether the subsequent support of universal service would be an appropriation subject to the Congressional budget process. The alternative would be for the measures to be part of the regulatory scheme delegated to the FCC or state PUCs. The present system is almost entirely in the regulatory category. The new system, while different, pursues the same policy goals as before, as part of reconciling the introduction of competition with the protection of universal service. Both are in pursuance of Congressional policy; in the case of universal service, the preamble of the 1934 *Communications Act* makes that clear. [get language]. In the case of a pro-competition policy, Congress has been on record in favor of

competition, tempered only with a concern about the potential impact on universal service. Thus, for regulatory agencies to pursue this course would be squarely within Congressional directives.

For the FCC, the measure would be in the nature of integrating its already existing subsidy schemes. Participants would only be those carriers who have applied for an FCC identification number -- signifying their being part of a larger network environment. Carriers that would not interconnect into the larger network system would not be included in the financing arrangements.

It therefore seems that the FCC would be within its delegated powers to introduce such a system. However, it would also make sense for the broad outline of the system to receive express Congressional and Executive approvals. But it would be a mistake to make approvals in a form that is as detailed as tax legislation, and with special provisions for various favored causes. The devil is in the detail, and a specialist agency such as the FCC, with its independent status, would be best in a position to deal with the details.

## **V. A NUMERICAL EXAMPLE FOR NET-TRANS ACCOUNTS.**

Let us look at a simple numerical example of NetTrans, using arbitrary numbers.

Assume:

1. an LEC with two customers service, which cost 30 each to provide, and whose price is regulated at  $A=10$ ;  $B=40$ . Cost of providing access to an interconnecting carrier is 5.
2. a competitive IXC interconnecting into an LEC, with an operating cost of 5 per customer, a regulated access charge to the LEC of 15.



3. a rival local CAP, also with a cost of 30, and a freely set price of 30 for its customer D.<sup>29</sup>

**Under the Present System:**

Customer A is being subsidized at a price that is 20 below cost. The revenue comes from two sources: (a) customer B, who pays 10 above cost; and (b) long distance customer C, whose call generates an access contribution of price minus actual cost of  $15 - 5 = 10$ .

In such a system:

- (a) the CAP will have an over-incentive to serve customer B. It will to be prevented from offering that service to B, or else the contribution by B to A would be lost. B thus has no choice among local carriers.
- (b) CAP will try not to serve customer A, who thus has no choice among local carriers.
- (c) IXC has an incentive to link up with CAP rather than LEC. It will be prevented from doing so to maintain the subsidy from C to A. (If it is permitted to bypass LEC, to maintain the subsidy to A, the rates on B would have to be increase from 40 to 50, thereby increasing the pressures on B to try to switch to CAP.)
- (d) Customers C and B call less than otherwise, because their rates are above cost.
- (e) Customer A calls more than otherwise since their calls are below cost.
- (f) LEC has no incentive to reduce cost of operations.

**Under NetTrans:**

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<sup>29</sup> We assume in this example, for numerical simplicity, that no CAP access charges exists. There is no problem in dropping that assumption. Similarly, the assumption that cost to serve customers A, B, and D, is in each case 30 is made for computational simplicity and transparency. There is no problem in assuming that costs are different from each other.

Local competition is instituted. Assume that the price for subsidized customer A remains at 10, plus the NetTrans charge.<sup>30</sup> The universal service shortfall for serving A is  $30 - 10 = 20$ . To cover this amount, a charge against net revenues is levied.

Total net transmission revenues are:

|                                 |       |
|---------------------------------|-------|
| IXC: C = 20 - 15(access charge) | = 5   |
| LEC: A                          | = 10  |
| B                               | = 40  |
| access charge:                  | = 15  |
| subtotal:                       | = 65  |
| ALT: D                          | = 30  |
| <hr/>                           |       |
| Total net revenues              | = 100 |

To yield the required 20 to support A's universal service out of the aggregate net revenues of the entire telecommunications system (a hefty subsidy) of 100 requires these revenues to be charged at a NetTrans debit rate of 25%. (The reason the rate is not 20% is that we assume here that customer A's rates remain at 10, plus NetTrans on that amount, i.e. that he does not pay the NetTrans debit charge on the subsidized part of the cost. The formula for the debit percentage can be calculated as

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<sup>30</sup>We assume here that the NetTrans assessment on A's payment would be passed on to A. However, there is no problem in absorbing this charge and supporting it also. It makes the calculation a bit more complicated.

The "benefitted service" of A would still be subject to a NetTrans debit, but it would not be paid by A, even on the portion he is paying. LEC would both be debited for the NetTrans and credited for it, so it would be a wash. One could therefore leave it out entirely from the NetTrans system. But in so doing, one creates unnecessary accounting and administrative problems, since the LEC (and ALT) would have to segment their revenues between different customer classes.



$\% = S/(R-S)$ , where  $S$  is the desired pre-NetTrans subsidy, and  $R$  is the total of net revenues. In our example  $S = 20$ , and  $R = 100$ , for a debit percentage of  $\% = .25$ . If we maintain A's price at 10, i.e. without NetTrans charge, the equation becomes  $\% = S/R-C$ . In this case, it would be 28.57146%.

This would mean debits on the various carriers net revenues:

IXC:  $-.25 \times 5 = -1.25$

LEC:  $-.25 \times 65 = -16.25$

CAP:  $-.25 \times 30 = -7.5$

### 1. Scrapping the Old System

Let us also assume for the moment that the previous subsidy schedules are abolished, and competition is free. What happens?

- (a) Customer A gets a voucher enabling him to get service at the previous rate of 10.
- (b) with the contribution in the access charge to LEC abolished, access charges would be at 5, plus NetTrans charge. Also, because of competition in the long-distance market, and since all other IXCs would have the same reduced access charge costs, the IXC cost to serve customer C would drop to 12.5 (comprised of IXC's operating cost of 5, plus its access charge payment (now at 5), plus the universal service contribution of 1.25 on its net revenue).
- (c) LEC lowers its contributory price to customer B, since it now faces competition for that customer from CAP. The price would drop to 30, plus NetTrans of 7.5, i.e. to 37.5.
- (d) LEC can charge A the market price, i.e. 37.5, against which A can use their voucher of 25.
- (e) CAP now contests customers A and B. Its price would be 30 plus NetTrans of 7 for 37.5. Let us assume for computational simplicity sake that the two customers remain with LEC. This will result in the following revenue streams and contributions.

In each case, revenues would match costs:

$$\text{IXC: } 12.5(\text{price to C}) - 5(\text{operating cost}) - 6.25(\text{access}) - 1.25(\text{NetTrans debit}) = 0$$

$$\text{LEC: A: } 37.5 \text{ total price} = 12.5(\text{paid by A}) + 25(\text{NetTrans Universal Service Voucher}) = 30(\text{cost}) + 7.5(\text{NetTrans})$$

$$\text{A, B: } 37.5(\text{price}) - 30(\text{cost}) - 7.5(\text{NetTrans}) = 0$$

$$6.25(\text{Access charge received}) - 5(\text{cost}) + 1.25(\text{NetTrans on 5 passed on}) = 6$$

$$\text{CAP: } 37.5(\text{price to D}) - 30(\text{cost}) - 7.5(\text{NetTrans debit}) = 0$$

$$\text{NetTrans: } 1.25(\text{IXC}) + 16.25(\text{LEC}) + 7.5(\text{ALT}) - 25(\text{Voucher A}) = 0$$

This is summarized in Table 1.

#### What are the implications?

- (a) customer A is paying the LEC almost the same as before. (The increase is the NetTrans amount. As mentioned, we could also assume that this amount is subsidized, and recalculate the amounts). However, since he receives a subsidy of 25 directly, such as by voucher (or the carrier of his choice would receive it) has a choice among carriers.
- (b) CAP can now reach A and B as potential customers. (B, due to the opening of the market and A, due to the NetTrans system which gives a choice also to subsidized customers.) If CAP's cost would be 29 instead of LEC's 30, it would gain both customers. CAP and LEC would, in effect, compete for A's subsidy voucher, by lowering their price.
- (c) IXC can use both LEC and CAP for access to customers. It pays either of them only cost based access charges.
- (d) IXC customer C contributes to universal service only its pro-rata share, whereas before it paid



TABLE1

| Carrier/Customer |     | Current Price | Cost       | Cost Paid to Other Carriers | Net Revenue | Entitled Prices | Subsidy Required | NetTrans Debit | Entitled Price + NetTrans | Voucher   | New Price  |
|------------------|-----|---------------|------------|-----------------------------|-------------|-----------------|------------------|----------------|---------------------------|-----------|------------|
| LEC              | A   | 10            | 30         | 0                           | 10          | 10              | 20               | 2.5            | 12.5                      | 25        | 37.5       |
|                  | B   | 40            | 30         | 0                           | 40          | 30              | 0                | 7.5            | 37.5                      | 0         | 37.5       |
|                  | IXC | 15            | 5          | 0                           | 15          | 5               | 0                | 1.25           | 6.25                      | 0         | 6.25       |
| IXC              | C   | 20            | 20         | 15                          | 5           | 5               | 0                | 1.25           | 6.25                      | 0         | 6.25       |
| CAP              | D   | 30            | 30         | 0                           | 30          | 30              | 0                | 7.5            | 37.5                      | 0         | 37.5       |
| <b>Total</b>     |     | <b>115</b>    | <b>115</b> | <b>15</b>                   | <b>100</b>  | <b>80</b>       | <b>20</b>        | <b>20</b>      | <b>100</b>                | <b>25</b> | <b>125</b> |

25% NetTrans

above average.

- (e) LEC customer B contributes to universal service only its pro-rata share, whereas before it paid above average.
- (f) CAP customer D contributes to universal service its pro-rata share, whereas before it was below average.
- (g) LEC would have major incentives to reduce its cost. First, because it could keep the cost savings. Second, because if it does not reduce costs, it will lose its customers to CAP. Third, because a built in productivity improvement factor will reduce in Period 2, the allowable cost to A and B could be set for Period 2 at 28 instead of 30, and LEC would be credited 2 less for each universal service customer served. And fourth, in Period 2 the calculation of required universal service support would not be based on LEC's cost, but on the lower of LEC and LT, in competitive markets. Hence, if CAP's costs have declined to 27, this would be the basis for the new calculation.

It should be noted that, obviously, the redistributions in this example depends on arbitrary initial numbers. In particular, we assumed a substantial net subsidy out of the entire telecommunications sector revenues of 100. This translates, in the case in which all other universal service contributions outside of the voucher system are dropped into a very simple system of raising revenues.

- (a) Each carrier owes on its transmission revenue, minus transmission payments made to other carriers, a NetTrans charge
- (b) Intercarrier charges are also assessed the NetTrans Charge.
- (c) The NetTrans revenues are returned to customers as vouchers, or to the carrier of their choice as credits.



This system appears similar to a sales tax, but it differs in several ways:

- (a) Carriers, rather than endusers, are charged. (This may be economically equivalent, but it probably makes a political difference)
- (b) Intercarrier receipts are chargeable
- (c) Credits can be given when the initial assumption of no other forms of contribution is dropped, which is realistic. This will be discussed below.

## **2. Keeping the Old System**

It is likely that not all previous contribution elements would be abolished. The NetTrans accounting would accommodate elements of the old system. If access charges, for example, would not be reduced, NetTrans could simply adjust for it. If IXC would still have to pay LEC an access charge of 15, including a contribution of 10 plus NetTrans charge of 2.75, the contribution would be credited to IXC's account against its debit of 1.25. IXC would then be owed a net of 11.5. LEC, on the other hand, would have to add 12.75 to its debit of 16.25, for a total of 29.

Similarly, if LEC does not reduce the price for customers B from 40 to 30 before the charge, its NetTrans account would look different. For example, if price to B would remain at 40, perhaps because CAP's competition has not yet arrived, then LEC's NetTrans account would be debited by its allowed internal contribution of 10, and it would not receive it doubly through NetTrans.

## **VI. ADDING NUMBERS TO THE CONCEPT**

The best concept will flounder if the impact on a powerful industry segment is unfavorable in the absolute in comparison to its rivals. Thus, it is important to estimate a rough impact of the NetTrans account system.

What is the cost of universal service? These are difficult questions to answer. In one study, prepared for the U.S. Telephone Association, Monson and Rohlfs conclude that the contribution of switched access provided to IXC's, and intraLATA toll service was between \$18.3 and \$21.1 billion, about \$12 per month per access line in the U.S., and twice the total earnings of the entire telephone industry.<sup>31</sup> (Figure 4) In another analysis, Bellcore finds a \$17.4 billion contributions to residential service.<sup>32</sup> These figures, originating as they are in one segment of the carrier industry, may be the upper bound. A study from another direction, for example, concludes that there are no LEC profits in private line service, i.e. that a major alleged source for a residential subsidy does not actually contribute.<sup>33</sup> (Figure 5)

Raising prices to cost would decrease telephone penetration. With price elasticities of demand estimated in various studies to be between -0.2 and -0.05 as the extremes.<sup>34</sup> An increase of 40% in rural rates<sup>35</sup> in price would lower rural penetration by between 2% - 8%.

The estimate for total transmission path revenues in the US is, back of the envelope, about \$150 bill. If the total universal service subsidy of \$18 billion (accepting the LEC industry's

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<sup>31</sup>Monson, Calvin S, and Jeffrey H. Rohlfs, *The \$20 Billion Impact of Local Competition in Telecommunications*, Bethesda, MD: Strategic Policy Research, 16 July 1993.

<sup>32</sup>NYNEX, filing to the Federal Communications Commission, *CC Docket 91-213* in the matter of Local Transport Rate Structure, July 14, 1993, Chart 1.

<sup>33</sup>Probe Research, Inc. *Report to MFS Private Line Economics and Implications for Competition*, 1993.

<sup>34</sup>Taylor, Lester D, *Telecommunications Demand: A Survey and Critique*, Cambridge, MA: Ballinger Publishing Company, 1980, p. 80, Table 3-1.

<sup>35</sup>Weinhaus, Carol, Sandra Makeeff and Peter Copeland et al, *Telecommunications Industries Analysis Project: What is the Price of Universal Service? Impact of Deaveraging Nationwide Urban/Rural Rates*, Cambridge, MA: Telecommunications Industries Analysis Project, 1993 July 25. See tables 6 and 7 in the appendix.

numbers) means a charge rate of about 17% against transmission path revenues.

Let us assume the same support level to continue. More back of the envelope calculations show the following distribution among the main industry segments in Table 2.

The order of magnitudes of these numbers is important. The reader may recall that among the criteria for a new system of financing was "transitional neutrality," i.e., that no customer class or carrier type should reap a windfall or be subjected to a shock. If the numbers indicate that this would happen, one may have to redesign the system.

## VI. CONCLUSION

Why fix the old system? The answer is that the old system is a patchwork that barely holds together, and that it is a stumbling block to a transition to a truly competitive telecommunications environment. We have neither real competition, since we are reluctant to dismantle the welfare arrangement everybody has gotten used to, while at the same time we are undermining the universal service support system by present inaction. It is the worst of both worlds. We can pretend that present policy is not at cross-purposes. And we can pretend that competition and technology will solve all problems, ignoring that the policy question is not one of efficiency but one of allocation. But sooner or later we will have to face the problem. The underlying forces will not go away; they bring us many benefits, but they also force us to pursue policy goals such as universal service in new ways.

If it'll break for sure, fix it now.



FIGURE 2

Annual Expenditures on Telephone Service  
By Selected Groups \*

|  | All<br>Consumer<br>Units | Urban<br>Consumer<br>Units | Rural<br>Consumer<br>Units | Census Region |          |          |          |
|--|--------------------------|----------------------------|----------------------------|---------------|----------|----------|----------|
|  |                          |                            |                            | Northeast     | Midwest  | South    | West     |
| Average Expenditures for Telephone Service by All Households |                          |                            |                            |               |          |          |          |
| 1980   | \$325 **                 | \$325 **                   |                            | \$335 **      | \$303 ** | \$339 ** | \$320 ** |
| 1981   | 360 **                   | 360 **                     |                            | 358 **        | 353 **   | 365 **   | 366 **   |
| 1982   | 375 **                   | 375 **                     |                            | 351 **        | 364 **   | 372 **   | 426 **   |
| 1983   | 415 **                   | 415 **                     |                            | 410 **        | 393 **   | 435 **   | 419 **   |
| 1984   | 435                      | 450                        | \$359                      | 433           | 407      | 445      | 458      |
| 1985   | 455                      | 466                        | 402                        | 459           | 419      | 457      | 500      |
| 1986   | 471                      | 478                        | 425                        | 470           | 444      | 477      | 494      |
| 1987   | 499                      | 503                        | 475                        | 501           | 464      | 505      | 532      |
| 1988   | 537                      | 544                        | 493                        | 524           | 498      | 545      | 585      |
| 1989   | 567                      | 577                        | 505                        | 570           | 532      | 572      | 601      |
| 1990   | 592                      | 599                        | 549                        | 589           | 547      | 616      | 611      |
| 1991   | 618                      | 621                        | 601                        | 621           | 595      | 616      | 647      |
| Percentage of Total Expenditures for Telephone Service       |                          |                            |                            |               |          |          |          |
| 1980   | 1.9 %**                  | 1.9 %**                    |                            | 1.9 %**       | 2.3 %**  | 1.9 %**  | 1.8 %**  |
| 1981   | 2.1 **                   | 2.1 **                     |                            | 2.0 **        | 2.4 **   | 1.9 **   | 2.1 **   |
| 1982   | 2.1 **                   | 2.1 **                     |                            | 2.0 **        | 2.3 **   | 1.9 **   | 2.1 **   |
| 1983   | 2.1 **                   | 2.1 **                     |                            | 2.0 **        | 2.3 **   | 1.9 **   | 2.0 **   |
| 1984   | 2.0                      | 2.0                        | 2.0                        | 1.9           | 2.2      | 1.9      | 1.9      |
| 1985   | 1.9                      | 1.9                        | 2.0                        | 2.0           | 1.8      | 2.0      | 1.9      |
| 1986   | 2.0                      | 1.9                        | 2.2                        | 1.9           | 2.0      | 2.1      | 1.9      |
| 1987   | 2.0                      | 2.0                        | 2.3                        | 2.0           | 2.0      | 2.2      | 1.9      |
| 1988   | 2.1                      | 2.0                        | 2.3                        | 2.0           | 2.0      | 2.2      | 2.0      |
| 1989   | 2.0                      | 2.0                        | 2.2                        | 2.0           | 2.0      | 2.2      | 1.9      |
| 1990   | 2.1                      | 2.1                        | 2.2                        | 2.1           | 2.1      | 2.3      | 1.9      |
| 1991   | 2.1                      | 2.0                        | 2.4                        | 2.0           | 2.1      | 2.2      | 2.0      |

Notes are at the end of the table.

Federal Communications Commission, Reference Book: Rates, Price Indexes, and Household Expenditures for Telephone Service, by Lande, James L., Washington, DC: Federal Communications Commission, May 1993.

# TOTAL SERVICE SPECIFIC COST STUDY NEW YORK TELEPHONE (\$ MILLIONS)

CHART I

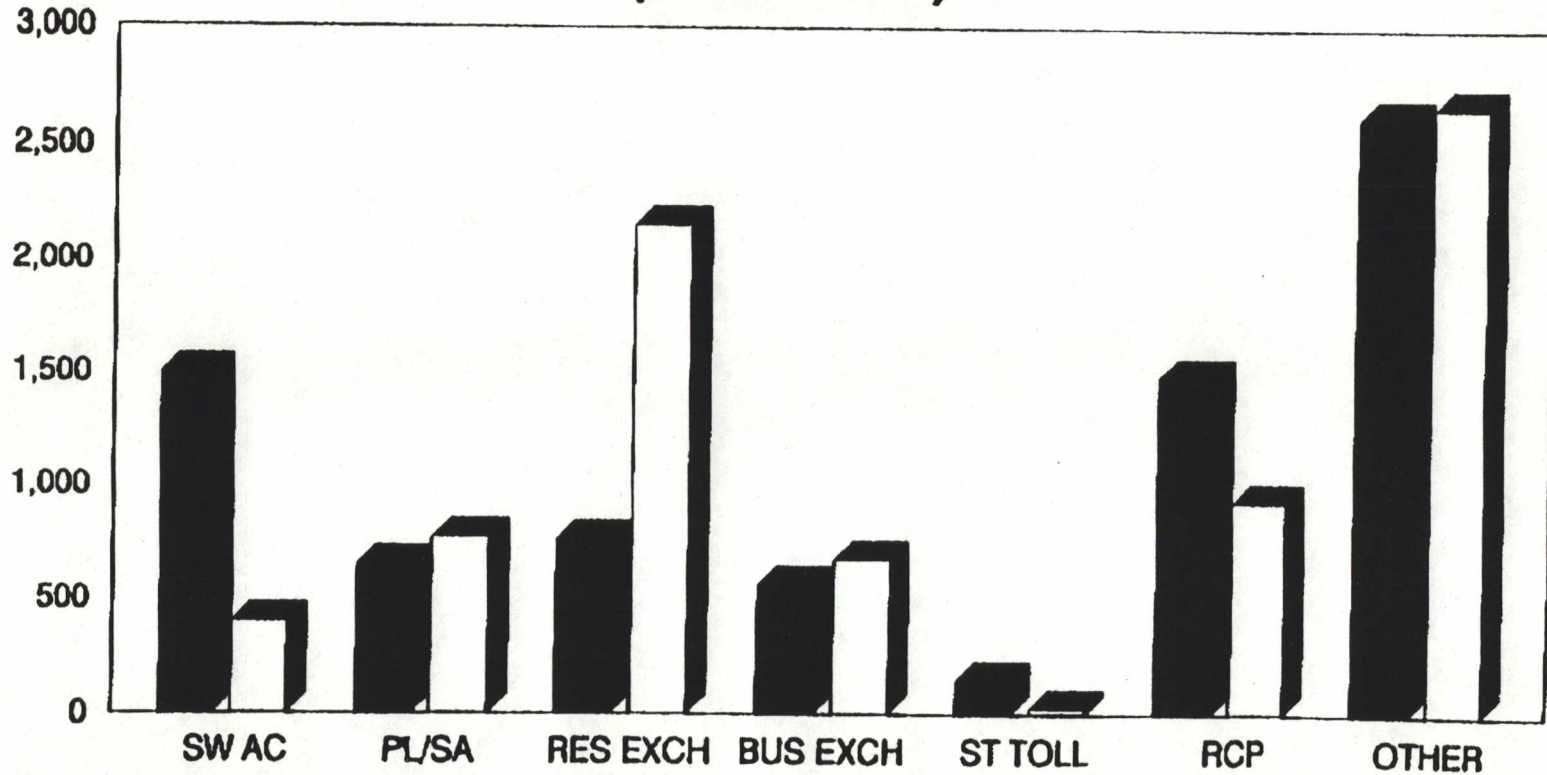


FIGURE 3

1) EUCL REVENUES ARE INCLUDED IN RES EXCH, BUS EXCH & OTHER.

2) OTHER INCLUDES PAY TELEPHONE, INTERCEPT, OPERATOR SERVICES, B&C, INSIDE WIRE, ETC.

3) SWITCHED ACCESS INCLUDES CCL, TRANSPORT, AND THE TRAFFIC SENSITIVE PORTION OF SWITCHING.

4) COSTS INCLUDE AN ALLOCATION OF COMMON COSTS ON THE BASIS OF DIRECT COSTS.

5) RES EXCH AND BUS EXCH INCLUDE LINK & PORT COSTS & REVENUES.

■ REVENUES    □ COST

SW AC - SWITCHED ACCESS  
 PL/SA - PRIVATE LINES/SPECIAL ACCESS  
 RES EXCH - RESIDENCE EXCHANGE  
 BUS EXCH - BUSINESS EXCHANGE  
 RCP - REGIONAL CALL PLAN

# Contribution at Stake

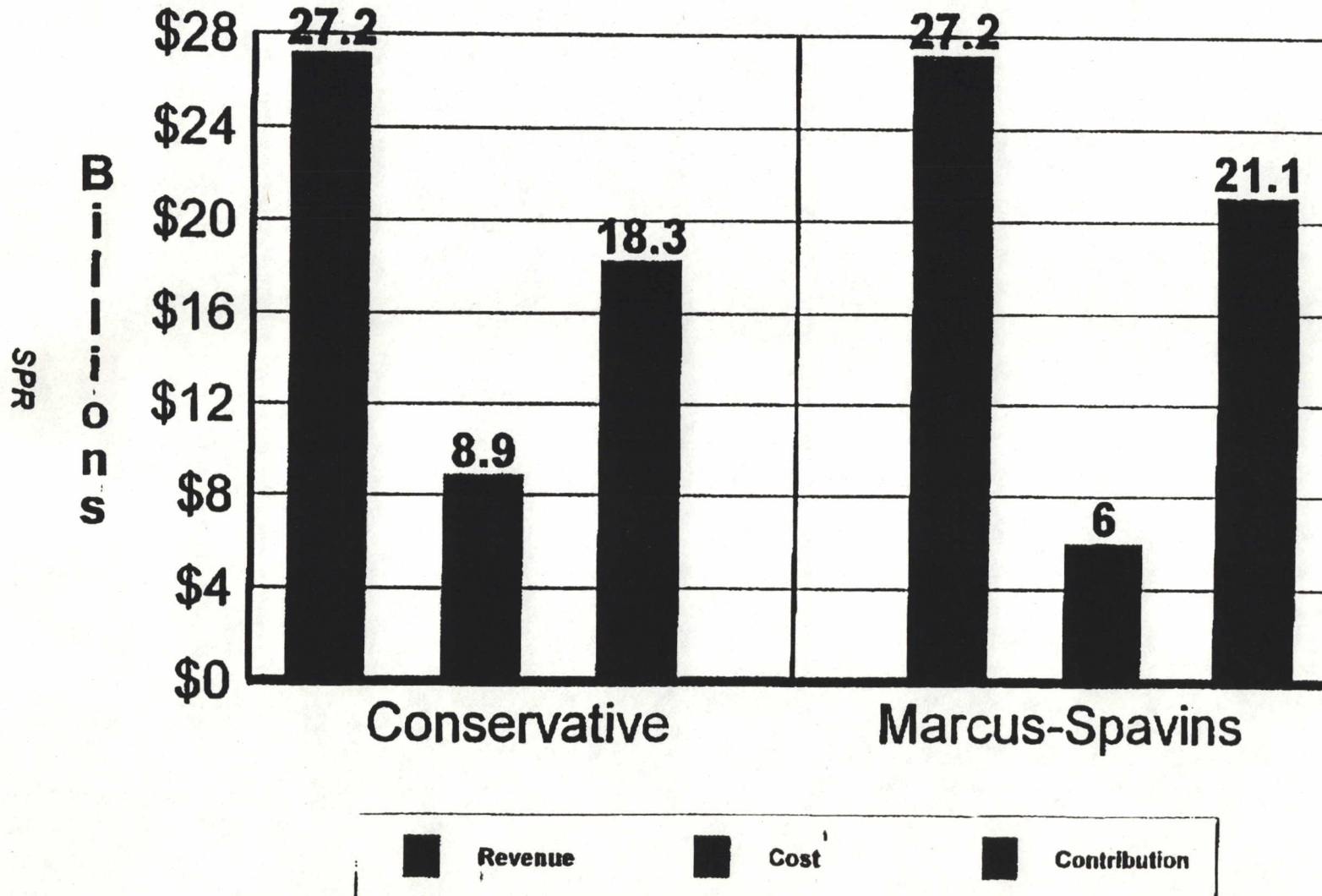


FIGURE 4



FIGURE 5

Summary of RBOC Private Line Economics  
 A. Return on Plant Investment<sup>2,3</sup>

| Measure      | PL Service | RBOC Average       |
|--------------|------------|--------------------|
| Total        | -0.8%      | 13.5%              |
| Loop Element | 7.5%       | 5.0%               |
| Transmission | 0.2%       | 31.8% <sup>4</sup> |

B. Operating Revenues (in \$B)

| Measure      | PL Service | RBOC Total |
|--------------|------------|------------|
| Total        | \$4.993    | \$58.746   |
| Loop Element | 1.535      | 16.716     |
| Transmission | 3.049      | 36.487     |

C. Operating Expenses (in \$B)

| Measure      | PL Service | RBOC Total |
|--------------|------------|------------|
| Total        | \$5.178    | \$37.801   |
| Loop Element | 1.061      | 13.270     |
| Transmission | 3.013      | 14.755     |

D. Gross Plant Investment (in \$B)

| Measure      | PL Service | RBOC Total |
|--------------|------------|------------|
| Total        | \$22.670   | \$154.746  |
| Loop Element | 6.292      | 68.799     |
| Transmission | 15.456     | 68.396     |

E. Operating Profit (in \$B)

| Measure      | PL Service | RBOC Total |
|--------------|------------|------------|
| Total        | - \$ 0.184 | \$20.945   |
| Loop Element | 0.475      | 3.446      |
| Transmission | 0.036      | 21.733     |

Probe Research, Inc., "Report to MFS Private Line Economics and Implications for Competition", 1993.

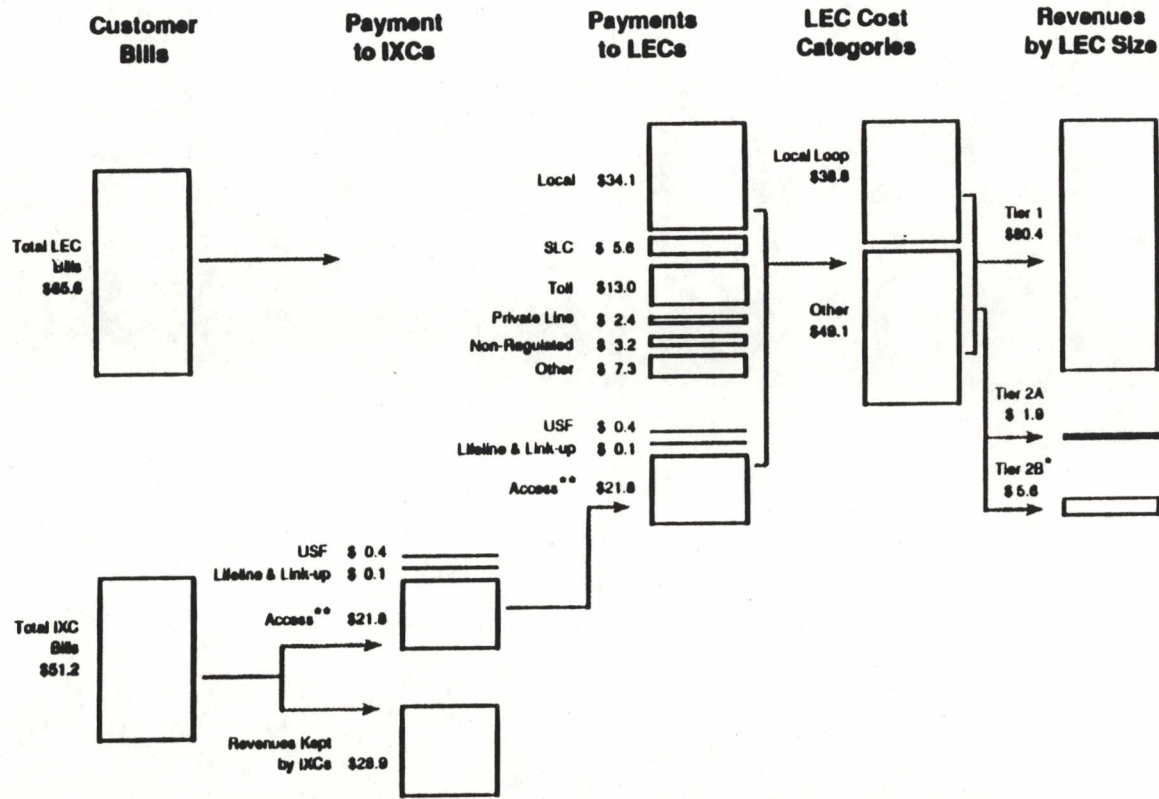
2. Return on Plant Investment is defined as: [Operating Revenues-Operating Expenses]/Gross Plant Investment.

3. In Part II and in Appendix I the derivation of these numbers is explained in detail. They are derived from the Probe Allocation Model. The revenue, expense and plant values are for network services only, i.e., a set of "miscellaneous" and "common" values are excluded from the calculations as these categories refer to "overhead" and non-network services.

4. For residential service as well as the RBOC average value, transmission includes switching. Theoretically, private line service tariffs were originally established with an assumption on some basic level of usage, not unlike the assumptions built into flat rate tariffs for residential service.

# Cash Flow: 1989 Customer Dollars

Dollars in billions

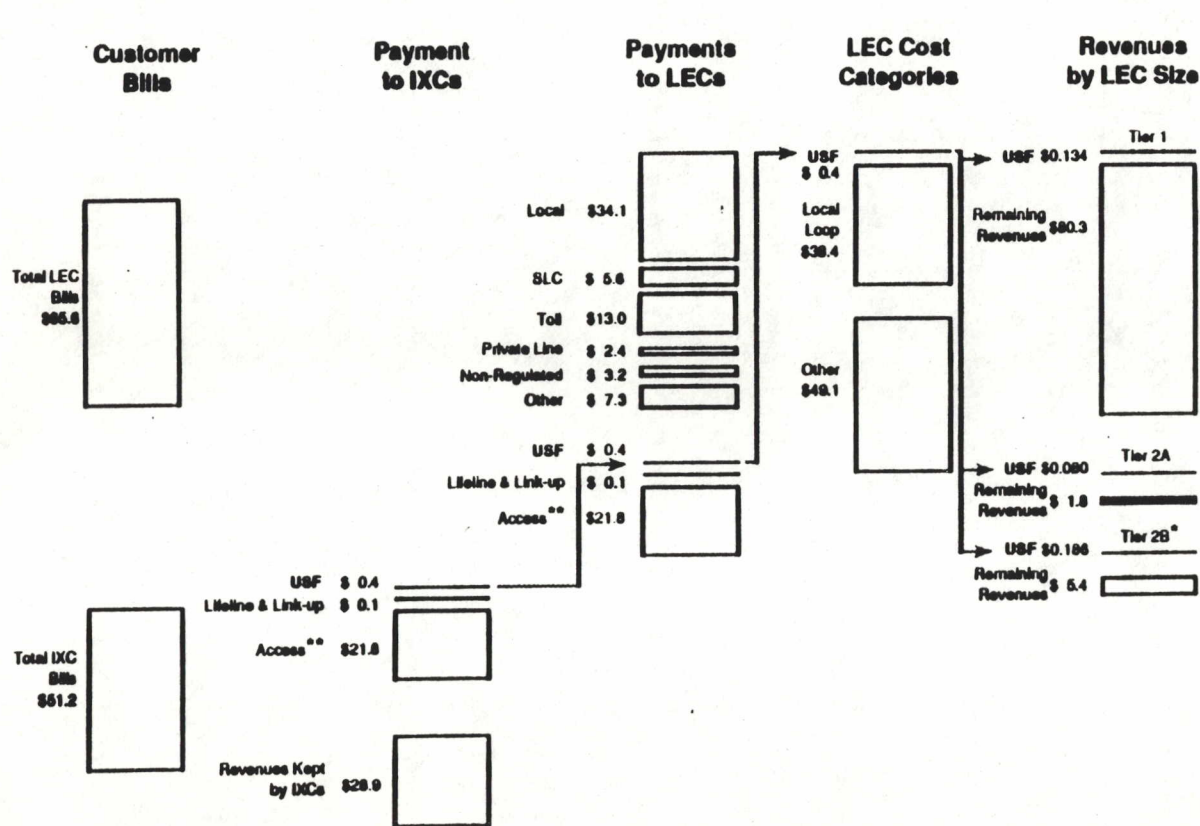


\* Primarily NECA pool companies.  
 \*\* Includes special

FIGURE 6

# Cash Flow: 1989 Universal Service Fund (USF)

Dollars in billions



\* Primarily NECA pool companies.  
 \*\* Includes special

**Universal Service Fund (USF)**

Financial assistance for LECs with high local loop costs. This assistance is paid by IXC customers as part of the prices for IXC services.

**Result**

Keeps state rates down, often applied to basic local service. Used to further the state and federal goal of universal service.

FIGURE 7