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Pricing issues in telecommunications

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By Robert W. Crandall, The Brookings Institution

Over the last quarter century, significant changes have occurred in telecommunications. The breakup of AT&T and a myriad of technological innovations have sounded the death knell for the theory of telecommunications as a natural monopoly, according to Robert W. Crandall of the Brookings Institute. In the following article, Dr. Crandall assesses a variety of pricing issues that must be addressed by regulators, telecommunications firms, and consumers in an increasingly competitive telecommunications market.

There was a time when telecommunications was considered a "natural monopoly." Today, scores of carriers actively compete for customers in voice, data, video and information services markets. Even if the natural-monopoly diagnosis was correct in 1914, the year of the ("Kingsbury Commitment" by which AT&T sought refuge from antitrust in federal government regulation; in 1934 the year in which the Federal Communications Act was passed; or even in 1949, the year in which the government first sued AT&T for monopolization, it surely is incorrect today. Monopoly power may still exist, but it is far from "natural." Rather, such monopoly exists either as a transitory phenomenon, awaiting imminent destruction by emerging competitive forces, or because of government regulation.

The changing structure of telecommunications

For decades, telecommunications (or, more properly, telephony) was the domain of a monopoly either franchised by or owned by the government. Fortunately, the United States avoided the worst excesses of having the government postal monopoly extend its tentacles into telephony. The U.S. telecommunications sector has always been privately owned, but federal, state, and local governments have been heavily involved in regulating and subsidizing telecommunications firms and, in the process, providing them protected monopoly status. Beginning in 1949 or 1969, depending on one's vantage point, this staid, stable arrangement began to come apart. In those years, the Federal Communications Commission (FCC) decided that competitive entry, for at least some services, would be socially beneficial. What it failed to recognize, however, was that regulation and competition are an unstable emulsion. By allowing entry, the Commission lost control over rates and services. Today, the state commissions are experiencing a similar loss of control.

Twenty-five years have passed since MCI's entry into "specialized" private-line (long-distance) services. In that time, we have witnessed the breakup of AT&T, the development of two or three new cellular carriers in every market, the completion of three competing national and a myriad of regional fiber optics long-distance networks, more than a score of new fiber optics metropolitan-area competitive-access providers, the wiring of more than 90 percent of the nation with fiber/coaxial cable networks, an enormous expansion of satellite services, and a highly-competitive equipment market. But that is only the beginning of the story.

In the past two years, enormous strides have been made in new technologies that will allow cable companies to enter telephone markets and telephone companies to enter video markets. Direct broadcast satellites are prepared to beam hundreds of channels to a video-thirsty public. New personal communications systems (PCS) are vying for 420 MHz. of radio spectrum that will allow them to compete with or extend local telephone company services. MCI has announced that it will spend \$2 billion to build local connections that bypass regulated local telephone companies' overpriced circuits. AT&T has purchased Mc Caw cellular in another move to bypass these local circuits.

In short, the natural or unnatural monopoly is dying. The condition appears terminal. Regulators are now facing a new imperative: To manage the transition to competition and perhaps to their own oblivion. This is not to say that they have no role in regulating the current incumbents, but they do risk regulating them into the same condition that swallowed the New York Central railroad and many of its rivals earlier in this century.

Regulating competition or regulating monopoly?

Most of the literature on telecommunications regulation is based on the theory that the sector has natural monopoly characteristics. The prescription for "optimal" regulation, or more properly quasi-optimal regulation, in such an environment involves a heady mix of Ramsey (inverse-elasticity) prices, peak-load tariffs, and optional pricing. Implementing such prices would be difficult even if the industry's technology were quite simple and unchanging. Regulators would have to know the elasticities of demand, the degree to which demand can shift among time periods, and the marginal cost of each service. These are not easily divined in even a simple industry like Portland grey cement or steel bars.

Telecommunications technologies are obviously neither simple nor stagnant. The accounting books of every regulated carrier reflect the irrelevancy of accounting costs for plants that would never be built under today's technological and market conditions. Moreover, new services are emerging at a staggering rate, further confounding regulators. Given this accelerating rate of change, regulators cannot hope even to have much more than an approximate estimate of optimal or quasi-optimal prices. Nor could they implement them if they had good estimates, given the political constraints under which they operate.

For decades, regulators responded to political forces by deliberately allowing rates to depart from even the crudest notions of economic efficiency. Local access rates were much higher for businesses than for residences even though businesses were generally closer to the switch than was the average residential subscriber. Residential rates declined with distance from the switch, a pattern that was obviously in conflict with efficient pricing. Long-distance rates were kept artificially high and uniform geographically. In short, regulators responded to political demands by erecting a series of cross-subsidies that could only exist in a world of protected monopoly.

That monopoly is now fracturing everywhere, partly because of deliberate federal and state regulatory policy and partly because regulators can no longer keep entrants out of the markets they supervise. State regulators at first opposed competition wherever it erupted, such as in terminal equipment in the mid 1970s. More recently, they have been reluctant to allow full 1 + competition in intra LATA markets. Over time, however, even the most recalcitrant regulators

have been forced to admit that they can no longer pursue the fiction that telecommunications must be a monopoly to be efficient. Competition is descending upon them from satellites, from FCC-issued licenses for PCS and cellular, and from large fiber optics networks built to attack the business market that regulators have deliberately overpriced.

The on-rush of competition is creating a variety of tensions for regulators. First, the competitive struggle necessarily elicits complaints from new competitors and incumbent carriers of inequities in regulatory rules. Second, the inevitable effect of competition is to squeeze out the cross-subsidies that regulators have so carefully crafted, evoking predictions of doom and gloom from populists representing retirees, poor households, and rural residents. The pricing issues in telecommunications regulation may thus be seen as the struggle to maintain quiet on both of these fronts.

Regulating competition

There is an extensive literature on the regulation of competitive markets, such as trucking, airlines, natural-gas production, the merchant marine, and even beauticians. The consensus that emerges from this literature is that regulation reduces output, retards innovation, and raises prices. There are few exceptions; the revisionists only argue that such results were intended by the legislators.

These unfortunate results derive from the tendency of regulators to accept all too readily various claims about the dangers of unfair competition, cream-skimming, or loss of universal service and to be far too reluctant simply to get of the way of competitive forces. Entry by new carriers is limited; existing carriers are forbidden to reduce rates in the face of intermodal competition; new technology is blocked by rivals' complaints; exit from unprofitable markets is forbidden or delayed.

In telecommunications, many of these tendencies are already in evidence. The new long-distance carriers have long opposed the full deregulation of AT&T on the grounds that AT&T would abuse its dominant status. Long distance carriers have been successful in using regulation and the courts to keep the divested Bell operating companies out of inter LATA services. Regulators continue to force carriers to maintain geographic averaging in long-distance rates and cross-subsidies in local rates in the face of mounting competition from new unregulated carriers. But entry continues despite these pressures, because communications technology is improving so rapidly. This entry inevitably undermines the regulators' attempts at cross-subsidization while creating major new pressures in the form of demands for interconnection at "reasonable" rates

The interconnection issue is probably the most important and contentious issue facing state regulators. For the present, the local telephone company's twisted copper pair remains virtually the only route into subscribers' homes or businesses for most carriers. The new competitive access providers (CAPs) will alleviate this bottleneck for larger central-city subscribers, but competitive alternatives for the more dispersed, smaller subscribers awaits the development of PCS, the transformation of cable systems into voice-data-information, or the conversion of cellular to a lower-cost digital technology. As a result, many carriers have to purchase access from local exchange carriers (LECs) while competing with these LECs in the delivery of many services, such as central-office and information services.

The regulation of interconnection arrangements among carriers inevitably raises two types of questions. First, how much "contribution" should be assessed inter-connecting carriers to pay for the local telephone company's requirement to serve a variety of customer sat non-compensatory rates? Second, how do regulators structure access arrangements that allow flexibility in carriers' purchase of access services and simultaneously guarantee that the LECs do not discriminate against some of these carriers with whom they compete?

Contribution charges. The first question is, in reality, an issue that derives from regulators' penchants for creating cross-subsidies. Access charges on long-distance calls are now set far above anyone's estimate of either the imbedded cost or the incremental cost of providing such access. These rates, in turn, induce carriers such as MCI or AT&T to look for alternative means for originating or terminating their calls. MCI's recent announcement that it will spend \$2 billion to build local networks to complete its calls and to offer other local services is surely a signal to regulators and LECs alike that something is wrong with the current rate structure.

The level of contribution charges in interconnection tariffs is largely a reflection of the degree to which other service rates are priced below cost, or more precisely, average incremental cost. Residential access rates and even rural business access rates are cross-subsidized (in the popular sense of the word) by inter LATA access charges, intra LATA toll, and other services, such as central-office services. These cross-subsidies are generally justified as a means of assuring universal access, but recent research by Jerry Hausman and associates at Massachusetts Institute of Technology (MIT) casts serious doubt on the notion that such subsidies are required to maintain universality. There can be little doubt, however, that these contribution charges will have to decline dramatically or the LECs will be left like the railroads, carrying only the unprofitable traffic.

Unbundling and Co-location. The second question is the degree to which interconnection can be unbundled so that carriers can pick and choose from the services provided by the local bottleneck monopoly. In the first few years after the AT&T breakup, carrier interconnection was arranged on a bundled basis. The local exchange carrier supplied local transport, switching, the final"...The impetus for such unbundling has grown with the development of competition between the local access provider and new carriers that still require some of the LEG'S services to reach the final subscriber. "(common) line to the subscriber, and (on occasion) even billing services. Over time, it has become clear that it might be more efficient for carriers to provide some of these services, such as local transport, themselves and to purchase other services, such as the common line. For other services, such as information services, messaging, or call-transfer services, carriers may desire very different access arrangements than those traditionally offered by the local exchange.

The solution to these problems has been to require that the monopoly local-access provider unbundle its offerings into a variety of different service elements that are tariffed separately. The impetus for such unbundling has grown with the development of competition between the local access provider and new carriers that still require some of the LEC's services to reach the final subscriber. To assure that the LEC does not discriminate unfairly against its new rivals, the FCC has mandated "open network architecture" to unbundle the LEC's services and to provide for

transparency in charges for access services across all customers, including the LEC's own competitive services.

The problems with unbundling, however, were clear almost from the outset. First, who is to determine how the LEC's services are to be unbundled? No matter how the bundles are designed, some carrier will argue that it needs another dimension of service and that the failure of the LEC to provide it amounts to unfair discrimination.

Second, the pricing of unbundled services presents regulators with a new nightmare. Given the rapidly changing technology and the preponderance of common and joint costs, regulators simply cannot know how much each element costs during each period of the day at each location. Engineering, economic science, or accounting rules will not provide the answers.

Finally, LECs have found that unbundling and equal access may require that the competitive service provider, who may be in direct competition with the LEC in some markets, will desire to have its equipment located very close to the LEC's own switch or even in the same building. As a result, the FCC and state commissions are now beginning to establish rules for co-location of competitors' equipment with LEC switches.

Establishing the rules for carrier interconnection when the LECs still control bottleneck facilities is bound to prove extremely contentious. On the one hand, there are no scientific or economic principles that will provide dispositive rules as to the dimensions of the LEC interconnection service or how it should be priced. Under these circumstances, regulatory proceedings can be endless; complaints can be equally unending. The only hope for regulators is to encourage competitive entry to ease the bottleneck and thus to reduce the need for regulatory supervision.

Rate caps. Given that LECs have a bottleneck monopoly in some services but face competition in others, regulators have the following choices for assuring that regulated services do not subsidize competitive ones: Ban the carrier from competitive services; require the carrier to maintain separate subsidiaries for monopoly and competitive services; or establish a regulatory regime that does not depend on the carrier's costs. Increasingly, the instrument of choice is non-cost-based regulation.

Specifically, the FCC and a number of states have substituted rate caps for cost-based regulation. This shift has been motivated by a desire to increase carrier incentives for efficiency and by the need to find a mechanism that eliminates the incentives for the carrier to shift costs among services to subsidize competitive ventures. Under rate caps, a carrier is allowed to increase rates by the rate of inflation less a productivity offset that reflects the inherently superior technical progress in telecommunications. Costs are irrelevant once the rate-cap formula is set; therefore, there can be no cross-subsidization from regulated services. Of course, the rate-cap formula is never set in stone for the ages; it must be reviewed periodically by responsible regulators. If this review looks at achieved rates of return, as it must, one really cannot say that future rate increases are not constrained by reported costs.

Moving to a rate-cap regime raises a number of difficult design issues. First, regulators must decide which services are to be regulated and which ones are to be released from regulation. A

major reason for moving to rate caps is relief from the necessity of regulating competitive services. Second, regulators may establish "baskets" of services in the rate cap regime, requiring that each basket meet the rate-cap limit separately. This practice limits the ability of carriers to rebalance rates and is therefore a bad idea from the standpoint of economic efficiency, but a safeguard for politically sensitive regulators. Third, regulators may limit the rate changes in any basket to a given band for similar political reasons. Fourth, there is a need to allow for rate increases due to "exogenous" events, such as changes in regulatory rules or other government requirements. Finally, there are a number of technical issues that involve the measurement of the productivity offset, the weights given to each service in a basket, the treatment of new services, and the criteria for deregulating individual services.

To date, the experience with rate caps has been very favorable. This approach to regulation was first implemented by the United Kingdom in its regulation of British Telecom, and it has exceeded expectations. British Telecom's performance was so much better than that assumed in constructing the original productivity off set that the Office of Telecommunications was induced to increase this offset substantially in a review of the program. The FCC implemented rate caps for AT&T in 1989 and for the interstate operations of LECs in 1990. My impression is that these rate-caps have worked in the sense that they have reduced the bickering between regulators and competitors in the past few years.

Isolating the bottleneck

Another approach to regulation of the remaining monopoly bottlenecks is simply to require that utilities that own such facilities not provide competitive network services through those bottlenecks. This, of course, is the solution chosen by the litigants and the court in the AT&T case in 1982. The divested regional Bell operating companies (RBOCs) were forbidden to enter interLATA markets, information services, or equipment manufacturing. The problem with such a solution is that it condemns the regulated firm to a market that may be declining due to competitive entry or due to the development of alternatives. This solution also denies the public the benefits of any potential economies of scope. It now appears that the use of rate caps, the on-rush of competition, and the lobbying pressure of the RBOCs will soon bring about an end to the line-of-business restrictions in the AT&T decree because of these infirmities.

The bottleneck may also be isolated through structural separation of monopoly operations from those providing competitive services. The FCC initially advanced such a solution in its proceedings to regulate enhanced services, but has abandoned it. More recently, Rochester Telephone has advocated this solution in its attempt to persuade the New York Public Service Commission (NYPSC) to allow it to place competitive operations beyond the reach of NYPSC regulation. Once again, however, this solution sacrifices the joint economies that may exist between monopoly and competitive services.

Ironically, the use of structurally separate subsidiaries may work best where the threat of cross-subsidies is least. If the monopoly and competitive operations have little in common, as in the case of an electric utility mining its own coal, there is little danger of sacrificing joint economies but also little danger of cross-subsidies. But where the monopoly and competitive operations could profitably use the same facilities, as in telecommunications, the problems caused by

structural separations are more severe. For this reason, rate caps would appear to dominate the strategy of separating the monopoly operations fully from the competitive ones.

Eliminating regulatory cross subsidies

Much of the rhetoric of telecommunications regulation involves the prevention of cross subsidies and the maintenance of "universal" service. In fact, this rhetoric is largely a defense of the political practice of conferring cross-subsidies on rural subscribers in particular and residential subscribers in general. Access is substantially under priced for these subscribers by almost any metric, and it is enormously under priced if Ramsey quasi optimal pricing is required for a company subject to increasing returns to scale. As I mentioned earlier, there is no credible evidence that this under pricing is required to maintain universal service. It is not even justified by crude notions of horizontal equity. Poor urban families subsidize rich rural ones. Poor residents of rural areas with distant family or friends pay far more for "essential" service than rich residents of small communities with an arrow geographic circle of friends and family.

Reducing the degree of this regulatory cross-subsidy is among the most important tasks facing telephone regulators today. Doing so would not only generate several billion dollars of general economic welfare, but it would pave the way for increased competition and a reduced need for regulatory supervision.

As long as regulators see inter exchange access charges, intra LATA toll, or enhanced central office services as sources of revenue for non compensatory local residential access services, competition will be slow to develop in the local loop. If, for instance, the average incremental cost of a local loop is, say, \$35 per month, but it is being leased at perhaps \$17 per month, entry by firms with technologies that cost \$30 or \$35 per month will be restrained. Once local rates are allowed to rise to incremental cost (ignoring the requirements of Ramsey pricing, which may be for even higher rates), entry may occur, allowing regulatory restraints on the LEC to be relaxed.

At present, regulation of local-exchange services is premised on the existence of a monopoly bottleneck in such services, but this bottleneck is not necessarily the result of technological conditions. Rather it derives in no small part from the regulatory practice of under pricing it. No one can know for sure precisely what the right price for residential access should be, but we do know that current residential rates are far too low in many or most jurisdictions.

Pricing usage

In many public utilities, hourly, daily, or even seasonal changes in demand create substantial investment and pricing problems. Capacity must be built to accommodate peak demand, but the cost of these peak-load facilities must somehow be paid for by the customer. Efficient pricing requires that the customer be confronted with the full costs of this capacity during peak hours and with no capacity costs during off-peak periods, assuming that such prices are feasible and generate revenues that cover full costs. Telephone service is no different. The cost of using the network during off-peak periods is very close to zero, particularly if there are no billing costs. But the cost of peak switching and transmission capacity is falling so rapidly and demand is so variable and shift able that Mitchell and Park of the RAND Corporation have concluded that peak-load pricing is likely to provide relatively small improvements in economic welfare once the increased cost of metering and billing is included.

Fortunately, regulators may not have to worry about usage-sensitive or even peak-load pricing for many services. If regulatory rates are set reasonably close to cost and open entry is allowed, we can let competitive markets decide how service providers should price their networks. No one has to tell my cellular company to bill me more for a minute at 10:00 AM than for one at 10:00PM, and no one needs to tell it how much higher the rate should be. (If there were open entry into cellular services, however, I would be willing to wager that my rate would be less than the current 39 cents per minute during daytime hours.)

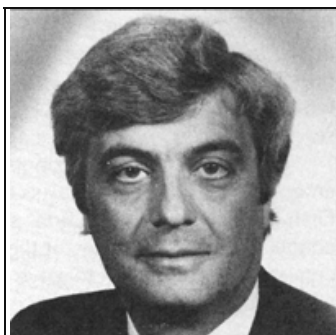
Infrastructure and universal service

Much attention has been devoted to the condition of the U.S. telecommunications infrastructure. Are we as progressive as, say, Singapore or Japan in stringing fiber optics or providing ISDN lines? Will we have a network that allows us to watch movies in a high-definition format? Will we be able to play complex interactive games or download the Encyclopedia Britannica in less than two seconds over a 1 megabit per second line? These issues are far too complex and varied to deal with here, and they only indirectly involve pricing issues. My view is, however, that we should not attempt to finance new bells and whistles for the telecommunications network through cross-subsidies from existing services. We cannot know which technologies are likely to be worth sub-siding, and we simply pay too high a price in terms of resource allocation in existing services by overpricing them.

Conclusions

Telecommunications is changing so rapidly that no regulator or student of the sector can hope to understand its technology, the nature of new services, the cost of producing various services, or the demand conditions for each. The major risk of regulation in this sector is that it will impede new technology by attempting to defend existing cross-subsidies through rate distortions and barriers. Fortunately, telecommunications regulators are beginning to understand that they must accommodate a technological and competitive revolution in this sector. The movement towards rate caps and reduced restrictions on entry as well as the somewhat slower evolution towards unbundled open-network architecture bode well for the future. The principal stumbling block is the reluctance to rebalance rates, but even this reluctance will soon be swept aside by the on-rush of competition.

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