Innovation in Telecommunications: Is the Innovation Brought by Divestiture Worth the Price of Competition?

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AFTER THE BREAKUP: ASSESSING THE NEW POST-AT&T DIVESTITURE ERA

Edited by BARRY G. COLE

COLUMBIA UNIVERSITY PRESS NEW YORK

Columbia University Press
New York Oxford

Library of Congress Cataloging-in-Publication Data

After the breakup : assessing the new post-AT&T divestiture era
edited by Barry G. Cole.
p. cm.
Includes bibliographical references and index.
ISBN 0-231-07322-4
1. Telephone—United States. 2. Telecommunication policy—United States.
3. Competition—United States.
4. American Telephone and Telegraph Company.
I. Cole, B. G. (Barry G.)
HE8815.A34 1991 384'.06'573—dc20 90-40710
CIP

Casebound editions of Columbia University Press books are Smyth-sewn
and printed on permanent and durable acid-free paper

Printed in the United States of America

c 10 9 8 7 6 5 4 3 2 1

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It is easy to assume innovation is an unmitigated blessing. The telephone itself was a spectacular innovation, and it is difficult to imagine what American life would be like today without such innovations as the transistor, the assembly line, and the personal computer. But innovation has its drawbacks. After all, one consequence of the transistor is "boom boxes" in city streets; the assembly line brought a new form of boredom to the workplace; and computers made possible error on a scale never before imagined.

The first response raises caveats about two aspects of technological development in telecommunications. First, to the extent that faster innovation is a product of competition, there are negative economic consequences that may outweigh the benefits achieved. (This conclusion is underscored when social disadvantages of innovation, such as threats to privacy, are considered.) Second, the history of telecommunications innovation teaches that those who benefit from innovation are often the last to pay for it.

The policy conclusion I draw is that regulation of telecommunication remains essential to (1) protect the public from deleterious consequences of innovation and competition, and (2) apportion fairly the costs of innovation to those who benefit from it. The relatively free forces of the marketplace cannot be relied upon to perform these functions.

The proliferation of novelty phones—shaped as dogs, cars, even a red high-heeled shoe—illustrates the point that some innovations may be worth more than others. The innovations of digital switching and touch-tone signalling make possible such useful services as credit card shopping at home, bill paying and banking at home, appliance control by telephone (so you can turn on your home air conditioner as you leave the office), a display of the phone number of the person calling, and even games at a distance. A glass fiber cable can already carry 100–

250 times as much as a copper cable; telephone engineers predict this will rise to 1,300 times copper's capacity. The fiber cable innovation may bring us switched video services in the next decade and ultimately full-motion broadcast-quality TV, dial-from-anywhere security cameras to watch for fire and burglary or to check up on the teen-age party upstairs, dial-from-home videocassette libraries that save trips to the video store. The telephone companies' fiber optic entry into the cable television business is also on the agenda.[32]

As Bolter and McConnaughey document, some telecommunications innovations have already arrived more broadly for consumers. These include facsimile transmission, computer-based services such as banking by teller machines and shopping by modem, audio services such as tax information lines and recorded "Yellow Pages" information.

However, there is a darker side to innovation. For example, the increased regulatory emphasis on competition made it possible for AOS to enter the marketplace on a broad scale as resellers of long-distance service. Their "added value" is little more than a surcharge on captive customers. Resulting proceeds are then shared with such customer captors as hospitals, hotels, and private pay phone operators. Thus, a hospital signs up with an AOS, then reaps new revenues as the AOS charges higher rates than the hospital did before for the same service and pays the hospital a commission based on the higher rate. It is difficult to recognize what additional level of service to consumers the innovation of increased charges purchases. In Massachusetts, consumers have complained about paying seventy-five cents via an AOS for pay phone calls that ordinarily cost twenty-five cents, and about being charged $3.45 for a call that without an AOS would have cost $1.00.[33]

As Sharon Nelson discusses earlier in this volume, another serious drawback to telecommunications innovation is its potential to erode privacy and First Amendment freedoms. Tomorrow's telephone system, with digital switches and fiber optic cable to nearly every home, could become a super cable television system, doing everything cable TV does now and more. It is also not unreasonable to project it will remain a natural monopoly—there will only be one telephone cable system entering each home—and the BOCs will attempt to free themselves of almost all common carriage obligations[34] as cable operators have successfully done.[35] This could mean that local monopolies would have unfettered control over what a subscriber could receive from a community's only carrier of television, only source of movies (movie theaters having been displaced by videocassettes), only carrier of news (newspapers by then having been converted to teletext, a transition that has been predicted since 1971),[36] only carrier of Congressional sessions,

town meeting debates, and classified ads—and perhaps the only carrier of pictures from inside your home to the local police (watching for burglars, of course). Not only could local monopolies thus control access to information, they could maintain records of information and entertainment habits of its customers. Indeed, they would arguably need it for billing purposes.[37]

Thus, even before we reach economic issues, we see that telecommunications innovation requires management on behalf of the public to prevent antisocial results. Much telecommunications innovation, for better and for worse, is at least partly due to competition—including competition spawned by divestiture. But perhaps we assume too easily that competition leads to greater innovation. As Bolter and McConnaughey suggest, for example, divestiture may not have significantly changed the innovation structure in the telecommunications industry. On the other hand, the lack of change may merely reflect the failure of divestiture to stimulate much competition. AT&T, after all, continues to dominate the long-distance (toll) market, controlling 70 to 80 percent of it.

There is an alternative explanation, however, to any failure of divestiture to stimulate innovation: competition may retard innovation. As J.A. Schumpeter has said, "The introduction of new methods of production and new commodities is hardly conceivable with perfect—and perfectly prompt—competition from the start. . . . As a matter of fact, perfect competition is and has always been temporarily suspended whenever anything new is being introduced. . . ."[38] By requiring short-term perspectives and by failing to reward innovations that are easily duplicated, "competitive markets may hinder efficiency in production by stifling technological advances."[39] The great success of Bell Labs during AT&T's monopoly days may provide evidence for this point.[40] So deregulating telecommunications carriers to stimulate innovation may have the opposite result. On the other hand, the bureaucracy usually spawned by monopoly and oligopoly is not famous for its tolerance of new ways of doing things.[41]

Be this as it may, the competition that may spawn innovation requires examination. Not only is the innovation itself a mixed blessing, but innovation-spawning competition is also far from an unmitigated blessing on consumers.

I do not mean to imply there are no consumer benefits from competition. The outcome of the deregulation of telephone set sales (which predates diverstiture) is a vivid illustration of the potential power of competition. At the same time telephone set technology was developing and marketers were providing a bewildering new variety of choices,

prices dropped like a spent rocket. It is hard to recall that, as late as 1980, the rental payments to New York Telephone over the fifteen year life of a telephone set would total $212.40[42] although sets could then be purchased for $25. Today low-quality sets can be purchased for less than the 1980 New York one-year rental cost of $14.16.

However, competition has consequences in addition to dropping some prices. Ordinary competitive markets do not guarantee to meet all demand, nor do they assure just, reasonable or stable prices—indeed, volatile prices and shortages are part of the normal competitive cycle. In contrast, the goals of regulation include justice, stability, guaranteed service, and universal service. Competition may produce many important benefits in certain contexts, as, for example, diversity and efficiency, but these regulatory goals are not among them.[43]

This is not to say that regulation, at least as developed to date, is without blemishes. As Roger Noll suggests in this volume, it is, in fact, as messy, slow and as often controversial as any political process. However, as Winston Churchill concluded in describing democracy to the House of Commons in 1947, the alternative is worse.

Even if we determine that, for the general society, competition-induced innovation is generally worth the price, the first specific sector of society to benefit from a telecommunications innovation is often the last to pay for it. A telecommunications utility has the incentive to lower prices to customers with high elasticities of demand (especially in its competitive markets), and recover the resulting lost income by raising prices to customers with low elasticities of demand in monopoly markets. In this way, captive monopoly residential consumers can be required to pay costs of innovations enjoyed only by customers in other, more competitive (or simply more price elastic) sectors.

Such cross-subsidy in the telephone business is a very old problem. It seems as though each technological advance was paid for in large measure by those who did not need to use it. Two historical examples make the point. AT&T began improvements to telephone plant very early in order to improve long-distance service. Indeed, the purpose of the complete integration of local and long-distance calling into one network in the 1890s was to expand the long-distance business, although the costs for the resulting upgrading of the local network were largely assigned to the local business.[44] Similarly, the national conversion to seven-digit dialing and 1+ long-distance dialing did away with the ease of three, four and five-digit dialing in many localities, in order to make direct dialing of long-distance calls possible everywhere. Direct dialing also required additional investment in the local portion of the network for equipment to recognize, route, and bill for the addi-

tional digits. Additional costs are and will continue to be imposed as the area code numbering system is changed to defer exhaustion of local office numbering codes. Indeed the entire fixed plant is very different than it would be if it had been constructed only for local calling.[45]

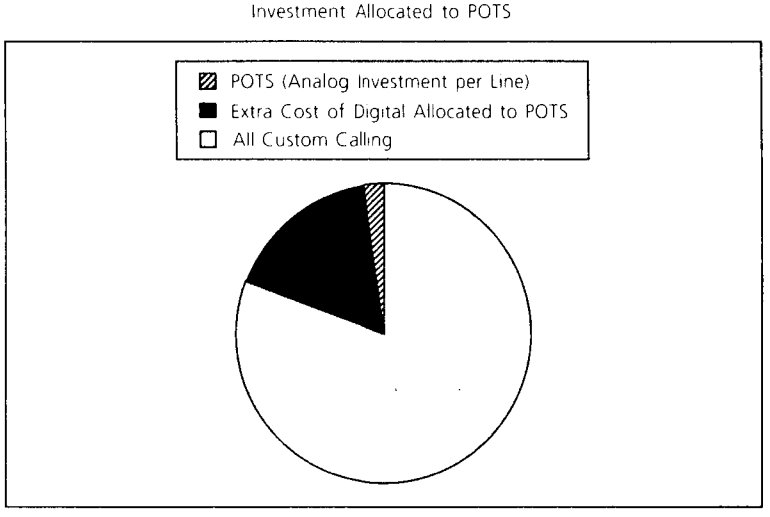
There is nothing inherently wrong with these innovations. They only become problems with respect to pricing. The question of which service—local or long-distance—should pay what portion of the fixed plant costs is almost impossible to answer without controversy when the services share the plant in unquantifiable proportions. This battle has been fought for at least eight decades.[46]

New digital services offer another current example of the difficulties created by the potential for cross-subsidy among services rendered by joint and common plant. High-speed data services and new custom calling services such as call identification and call tracing were made possible by the introduction in 1981 of digital switching machines, essentially the computerization of central office switches (this advance also made touch-tone service much more economical to provide on a marginal cost basis). Thus, the new switches provide ordinary local and long-distance service and also make possible new digital services.[47]

According to one telephone company study of this new switching technology (figure 7.6),[48] this advance increased the company's current incremental investment per line by $52. Thus, assuming that the older analog machines continued to render acceptable basic local and long-distance voice service, the incremental investment cost per line of digital service is $52. (There are also some offsetting savings in circuit equipment used to translate digital signals to analog or back, but these are not germane to basic voice service.) However, digital services are optional services for which the customers have relatively high elasticities of demand. Therefore a utility offering both optional, high elasticity digital and essential, low elasticity local monopoly service has an incentive to cross-subsidize digital services with local service revenues.[49]

Telephone companies will often contend that, on the basis of economies achieved by the new technologies alone, their investment in digital switching is justified on behalf of local and toll services. However, these economies are often created by such means as artificially raising the depreciation expense ascribed to it. Indeed, increased depreciation rates are ascribed to innovation but largely collected from users who do not use or need the innovations. The industry's depreciation reserve ratio, for example, increased by 56 percent from 1980 to 1986 (from 18.6 percent to 29.0 percent), due to telephone companies' need to replace equipment more frequently to keep up with technological

FIGURE 7.6

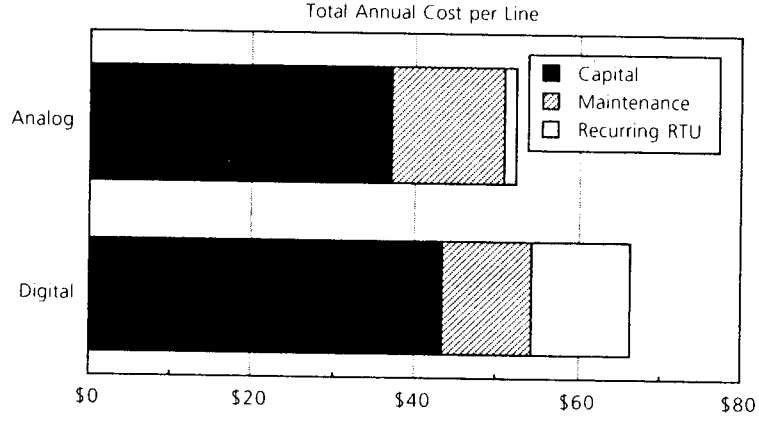


Sources: Mass. D.P.U. 86-33, Ex. NET-120 (Incremental Cost Study)—Book 1, Tab C2, p. 3, & 3CCS, (April 1986); Book 3, Tab 22, p. 196; Book 3, Tab 10, p. 136.

innovation. However, the bulk of this expense is allocated in rates to basic local subscribers via assignment to local switching machines, although the local machines thus depreciated more quickly are rendering perfectly adequate basic grade service.[50] Even so, telephone company data show the digital machines are not economical for voice service alone (figure 7.7).[51] At least one Bell company spokesman, in response to this presentation, acknowledges that new technology has higher unit costs.[52] He argues that the extra costs are justified by the value of the new functions performed by the innovative technology.[53]

To the extent that new functions are thus the justification for the new technology, the incremental costs of the new technology should not be recovered from ratepayers other than those who benefit from the new functions. Although the digital machines are, by one accounting, somewhat less expensive to maintain, this is more than offset by their much greater capital cost. Furthermore, counting recurring software costs ("right to use" or "RTU" fees) as additional maintenance erases the digital machines' maintenance advantage as well (figure 7.7). Nevertheless telephone companies have installed digital machines in place of analog machines. Such innovation may be as much a product

FIGURE 7.7



Sources: Mass. D.P.U. 86-33, Ex. NET-120 (Incremental Cost Study)—Book 1, Tab C2, pp. 3,4,6, @ 3CCS, (April 1986); DR ATTCOM-35.

of telephone companies' ability to find a monopoly customer base to finance it as of any other factor. The immediate beneficiaries of telecommunications innovation are thus often the last to pay for it.

My comments should not be interpreted as arguing against innovation, competition or divestiture. Rather I have argued for the maintenance of vigilant regulation alongside innovation, competition, and divestiture. All of this should be guided in accordance with consensual social values such as economic equity, privacy, adequate supplies of essential services, and prices for essential services that are just, reasonable, stable, and least-costly.

Bailey M. Geeslin

The dawning of the Information Age is presenting new opportunities and creating new challenges for the industry as well as its customers. I will offer an insider's perspective on a few of those opportunities and challenges which will affect the rate of deployment of innovative new services.

Consider the following fundamental change in network usage, the staple of the public networks supplied by the telephone companies: the growth potential of network usage is limited and it is obvious that

"voice grade usage" is a mature business, continuing to grow, but within predictable growth limits. Many telecom managers agree that from a financial and economic perspective future viable business growth in the transport of information will be represented by the phenomenon of Information Age "applications"—the use and packaging of telecommunications network functionalities by enhanced service providers into retail end-user services.

However, the characteristics of Information Age applications versus voice grade transmission are startling and have a profound effect on the management of the business as well as regulation. Take, for example, the effects on marketing. With the voice grade network, the product of transmission of information on the supplier's side is the same as the product of a telephone call from the consumer's side. That is, the network companies are retail businesses dealing directly with consumers. The product as seen by both parties is identical: the transmission of voice information.

The Information Age is changing that fundamental product perception. In the Information Age, applications of telecommunications services go well beyond voice grade transmission. The transport of voice information—indeed the transport of information—ceases to be the product that is bought by the telecommunications services customer. Two examples will help crystalize this concept.

A very simple example is accessing a database, which is done frequently at work as well as at home. The product being bought here is definitely not the transmission of information. The product being bought is a screen of information, either on a monitor or through a printer. A more complex example is sophisticated health monitoring services such as those contracted for by a county health department. The customer using this Information Age application may not even be the one who is paying the bill, and again, the transport of information is no longer a retail product.

This change in telecommunications products from retail to wholesale affects both the people who deal with the industry and the industry which deals with the people wanting to use its services. Both have a lot to learn about marketing Information Age applications.

First, consider the effect of wholesaling on a telecommunications business which thinks of itself as a retail business. With the redefinition of the transport product by the Information Age application, the retailing telephone company often looks upon people who want to use its services as intruders and rejects them, sometimes rather rudely. The history of the old Bell System has proved this to be true in the past, and that tendency still exists with some of its current successors.

The problem with this less than amicable relationship is not one-sided. Sometimes the people knocking on the door, wanting to use the network, do not try to gain entry very politely. Users of network services in applications in which transmission is apparently not the primary product very often say that they have problems doing business with the telephone companies. The users feel that one of the problems which leads to resentment is that they must go to the Bell people and convince them to provide services, even when the use of the service by the users may be a good deal for Bell. But is anything wrong here? Bell companies do that with vendors all the time. Building sound business relationships is part of management's job.

Sound industry/network user relationships do not end with understanding customer focus, and shifting retail/wholesale markets. The telecommunications industry must feel comfortable that there are a number of reputable retailers in business using their services. In addition, retailers must feel comfortable that they are getting a fair deal from the wholesalers; they must like and use the industry's services and see terms as reasonable. The onus is also on the company to modernize the network so that the "wholesale" machine is producing what users are seeking. This leads to another misperception.

There is a tendency today to define the capacity of the network in terms of voice grade telephone calls. This tendency leads to a belief that the capacity of the network is well beyond that which will ever be used. However, the use of network capacity of bandwidth for services other than voice telecommunications will not leave an excess inventory of capacity. On the contrary, the capacity problem being faced right now is not one of excess, but rather a lack of bandwidth beyond 2.4 kilobits on an end-to-end basis through the switched network. Aside from the 56-kilobit services used primarily with personal computers, there is very little end-to-end capacity to provide Information Age services such as point-to-point full-motion video. This requirement to invest in increased end-to-end capacity leads to a final phenomenon. That is, the telecommunications networks in the United States have the characteristics of infrastructure. Infrastructure traditionally provides capabilities prior to identifiable assessable applications for its use.

That causes great difficulty in convincing upper management to invest in new network capabilities. With the prevailing short-term business orientation in this country (as well as the regulatory restrictions of rate-of-return or profit regulation), very often senior management wants names, addresses, social security numbers, and checking account numbers of the customers who are going to pay for this investment. This concern on the part of management is only justified to the extent that regulation will not allow returns to the company's shareholders which are commensurate with the risk incurred (incentive regulation in the form of price regulation would reduce the risk concerns of management). This is certainly true when you examine the major trends toward services with increasing bandwidth and the growth of data usage in this country. Regulatory risk aside, the investments in the infrastructure which are required to satisfy wholesale markets are in my opinion risky, but worth making. These capacity and usage trends are a good barometer of what will be a healthy and vibrant partnership between the telecommunications industry and enhanced service providers, if both the industry and the users "step up" to meeting the challenges which will accompany the opportunities.

As we move into the Information Age, there are many opportunities for both the industry and the users of network services. However, both the industry and the users of the industry's services must work at developing business relationships. The industry must strive to understand and service our wholesale markets and to modernize the network, within regulatory constraints. Retailers have to develop a reputation as good business partners and providers of services which will benefit the community. Together, the industry and the users of telecom services can make the Information Age a reality.