The Gordian Knot

Political Gridlock on the Information Highway

W. Russell Neuman
Lee McKnight
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This accessible introduction to the current debate about the development of a National Information Infrastructure locates the debate in its historical context and outlines a bold vision of an open communications infrastructure that will cut through the political gridlock that threatens this “information highway.”

The authors—social scientists as well as technologists—detail what is wrong with the political process of NII policymaking and assess how different media systems (telecommunications, radio, television broadcasting, and the like) were originally established, spelling out the technological assumptions and organizational interests on which they were based and showing why the old policy models are now breaking down. This analysis leads logically to a policy proposal for a reformed regulatory structure that builds and protects meaningful competition but abandons its role as arbiter of tariffs and definer of the public interest.

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Introduction

As legend has it, in ancient Phrygia on the vast plateau between the Black and Mediterranean Seas in what is present-day Turkey, King Gordius tied a large knot of tangled rope. He took special pleasure in challenging visitors to try to untie the Gordian Knot, claiming that he who did would rule all of Asia. Many tried and failed. When Alexander the Great passed through Phrygia, he was of course confronted with the traditional challenge, which he accepted without hesitation. He drew his sword and cut the Gordian Knot with a single dramatic stroke.

In common usage today, the Gordian Knot metaphor is used to identify problems that require a bold stroke and fresh thinking for a successful resolution. Given the frustrating complexities of so many of today’s social problems, the metaphor is particularly seductive to the policy analyst and, alas, we have succumbed. It is an unlikely title for our book, because, generally speaking, we share a rather strong skepticism of dramatic and simple resolutions proposed for complex political and economic problems. But we have become convinced that in this case the metaphor is apt. We will attempt to persuade our readers that our conviction is well founded and our judgment sound.

The focus of our case study is the entangled policy debate involving swift and unprecedented changes in the economics, contract structure, and technology of human communication that we identify as the communications revolution. The historical driver here is technology. We will argue that the generic properties of the evolving communications technologies are well understood. The social, economic, and political ramifications of these changes, however, represent a significant and enduring puzzle. Although far from technological determinists, we believe it is important
to acknowledge that the technology of the integrated digital electronic network has inherent properties that distinguish it from the disconnected mix of photograph records, letters, books, newspapers, and telephone, computer, and broadcasting systems that preceded it. What is subject to our control is how these technologies are structured to meet human needs, and it is in the spirit of that challenge that we proceed.

In selecting a focus for analysis, authors are frequently counseled to pick a historical case of appropriate obscurity rather than a prominent or current event. The inevitable critical reactions of those with vested interests, and the likelihood that new developments will simply overtake the analyst, put the researcher in an awkward position. In ignoring such well-considered advice, we hasten to explain that this book is a bit of an exercise in catharsis.

We characterize ourselves as veterans of the high-definition television (HDTV) wars of the 1980s, a particularly intense national and international competition for technical preeminence in advanced television. Through our association with the Advanced Television Research Program at the Massachusetts Institute of Technology, we conducted a series of studies on audience reactions to new display technologies and a parallel series of economic and policy studies of HDTV. Although from our point of view we were simply conducting the best scientific research possible, we were well aware that we were perceived as being on the “MIT team” and thus supporting MIT’s entry into the TV standards sweepstakes. After work we would gather to reflect on the day’s events and discuss which company or research laboratory was winning or losing the most recent technical competition. But in these discussions we were repeatedly struck that our fellow researchers seemed oblivious to the terrain of the battlefield on which they were fighting. As social scientists, whose careers would presumably not be judged on the basis of which engineering design won out, we came to define ourselves less as soldiers than as war correspondents and strategists, chroniclers and students of an intriguing and serious techno-economic conflict. Why did so few understand the rules of the game?

We attempt to accomplish three things in this book: explain the current technological debates in terms that a nontechnologist can easily understand; put the technological debate in a broader historical context,
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focusing on the political economy of technical change; and offer some conclusions on what a policy framework for managing the commu-
nications revolution should include, as well as a critique of the recently passed Telecommunications Act of 1996.

This is a book about how technical change is forcing a policy para-
digm shift. Since the era of the robber barons, the technical character of
telegraphy, telephony, and broadcasting required that each be regulated
as a public-service monopoly. The digital revolution (in which HDTV is
a relatively minor development) will not require regulated monopoly pro-
visions; rather it will be best served by open, undistorted, healthy eco-
nomic and technical competition. As we review the literature, we find
universal acknowledgment that in vaguely defined and distant future,
competition will be the norm; but until then, there must be new legis-
lation and armies of regulators to manage the transition. This strikes us
as a big mistake. The Telecommunications Act of 1996, for example, con-
tains more than 100 pages of detailed legal mandates and provisions in
an ill-advised attempt to micromanage the transition to deregulation
rather than cut the knot. The act calls for more than 90 bureaucratic
inquiries, evaluations, and rulings by the Federal Communications
Commission as part of its implementation—which, despite the FCC's best
intentions, are likely to drag on for years. Some provisions of the act
were challenged in court within hours of its being signed into law.

The act will only delay and distort the process unnecessarily. It is
best to proceed quickly. It is fruitless to attempt to untie the knot one
cord at a time. We term our proposal Open Communications Infra-
structure (OCI), and it will be developed in some detail in the pages
ahead.

There are two schools of thought in communications regulation, re-
flecting the polarization of economic theory more broadly defined: one
emphasizes the free market, and the other focuses on the need for at least
some regulation. Our analysis proposes a third perspective. The con-
servative free-marketeers emphasize that market competition is the most
efficient allocative mechanism. According to this view, the regulators are
the bad guys because they afflict the open market with the distortions of
political power. More "liberal" policy analysts, however, point out
that although markets are indeed generally efficient, there are classes of
Introduction

market failure that require authorities to step in from time to time and substitute their judgments for those of the market gone askew.

The conservatives argue that the regulators, although perhaps well intentioned, are slow to respond to technical change, ill-equipped to assess value and benefit, and inevitably subject to distorting political pressures. We agree. The liberals argue that left to their own devices, the capitalists are likely to be rapacious, monopolistic, and cavalier about the public interest. We agree with this observation as well. As a result, we believe that a new paradigm for regulation is required—one that puts a reformed regulatory structure in the position of ensuring meaningful competition while abandoning its role as arbiter of carriés and definer of public service and public interest.

The need for a dramatic shift in the policy paradigm is supported by our observation that technical change in this field is proceeding much more rapidly than has been generally acknowledged. Much of what is now considered to be decades away will likely be of economic significance in just a few years. We watched this temporal cognitive distortion again and again in the HDTV wars. Our associate, William Schreiber, obtained funding in the early 1990s from a consortium of American television networks and equipment manufacturers to provide an American alternative to the Japanese model of HiVision. From the beginning, he suggested to his sponsors that advances in digital technology dictated a close look at an digital television system—not just a higher-quality picture. His appeals were repeatedly rebuffed by the industrial engineers as being too academic and likely to delay the development of a practical system; they considered digital television a good idea for new systems a decade or two hence. For eight years industry competed to submit designs for analog HDTV systems until the very last day to file proposals with the Federal Communications Commission. Late that Friday afternoon in June 1991, an unknown new proponent, General Instrument, a cable equipment company working quietly with some of Schreiber's former students or the periphery of the HDTV community, put forward a working prototype of an all-digital system. Why did they propose such a system while the central players did not? Perhaps because they did not know any better—that is, they were not caught up in the prevailing technical ideology that dictated that such a system was too impractical and difficult
to be achieved for decades. Within four months, each of the other four consortia abandoned their previous systems and demonstrated all-digital systems of their own. When necessary, in the process of technological development, decades can shrink to months. It is a pattern that is repeating itself frequently in technology development, and if our arguments find some favor, perhaps in policy reform as well.

The burgeoning Internet, the information highway metaphor, and the idea of a National and Global Information Infrastructure are central to our thesis. The metaphor draws attention to the parallels between transportation and communication. Highways and infrastructure are beneficial public entities that facilitate communication and trade. They are tied to national productivity and competitiveness, and although usually built by private contractors, they are generally designed and regulated by public authorities. This public-private tension is critical. In the late stages of the Clinton transition in mid-December 1992, there was a high-profile discussion among business executives and policy advisor in Little Rock, Arkansas. AT&T Chief Executive Officer Robert Allen remarked that the information highway was of great importance to the economic future of the United States, but that it was not a matter for federal involvement; private industry would design and build the highway, and government regulators should simply get out of the way. There was an awkward flash of tension as Vice President-elect Gore jumped up to note that as with the interstate highway system, the private sector might not be able to go it alone; it was an issue simply too important to be left to commercial largesse. President-elect Clinton broke the tension with a joke, and the conference moved on. But the issue to which we shall return as the Great Debate—that is, the role of the state versus that of private enterprise—remains.

Many adherents of Gore’s school of thought draw on federal involve-
ment in the design and funding of the interstate highway system during the 1930s as the historical model for the electronic highway of the
next century. For us, however, the most telling historical parallel would be the railroad robber barons of the late nineteenth century. The federal government, through a variety of incentives including generous land grants and subsidies, did its best to encourage private investment in railways in the interest of commercial trade and geographic expansion. Although
there is continuing debate among economic historians on the importance of rail investment to economic growth, the huge fortunes amassed by Carnegie, Gould, Vanderbilts, Morgan, and Hazards speak eloquently to the question. Once the infrastructure was built and was threatened by devastating competition, the barons colluded to set prices and protect their oligopoly. Farmers and traders who depended on the rail system to transport their produce to market were outraged at the exercise of market power by the barons, and demanded federal intervention. The American route system was largely completed by the 1890s. It was not until 1888 that the Interstate Commerce Commission (ICC), predecessor of the FCC, was established. Furthermore, it was not until the early 1900s that the Congress and the courts finally gave the ICC the legal authority to exercise meaningful oversight. In retrospect, we have at hand a treasure trove of fifty years of economic and legal drama—flagrant cases of stock manipulation, price rigging, court cases dragging on for decades, even gun battles—as entrepreneurs fought with each other and with the government to win control of huge segments of the system. The result was too dynamic perhaps to be characterized by the currently fashionable term gridlock, perhaps the trench warfare of World War I better captures the spirit of the antitrust of that era.

AT&T's Allen tells Vice President Gore to get out of the way—it sounds right, resonating with politically conservative orthodoxy. But historically that is not the way it plays out. If a regulatory structure can be manipulated for profitable advantage, it will be. Those who benefit and have become most adept at manipulating the regulations wittingly erect the need to do away with government regulation altogether, and it is this delicious irony that we propose to sidestep by cutting the knot. Although we should move directly to meaningful competition in the electronic network of networks, it must be with the understanding that, despite their rhetoric, real competition is not what the CEOs have in mind. Thus there is a continuing and important role for government.

The first chapters introduce these central themes and describes the players and stakes. As we write, a carefully negotiated legislative package entitled the Telecommunications Act of 1996 has just been signed into law. Although the legislative rhetoric celebrates competition and deregulation and the act is described by some observers as encouraging
open competition among different industry segments, it is in fact a
delicately negotiated package of deregulation, partial deregulation, and
re-regulation. The key to the act's character is the use of the term "safe-
guards." Safeguards in the rhetoric of the legislation speaks to rules and
procedures to restrict the potential of the vestiges of monopoly abuse
until "true competition" comes to pass. Each of the players wants the
safeguards to apply to everybody else, and each will work the evolving
system with considerable skill to block any action perceived to be con-
trary to their interests. As usual, the devil is in the details—and there
are details aplenty. Some have jokingly termed the new legislation the
"Communications Attorneys' and Consultants' Full Employment Act of
1996." In our view such legislation, like the original railroad legislation,
will tend to forestall and constrain real competition, perhaps as then, for
decades. New legislation or not, our near-term fate is gridlock.

The second chapter develops the argument that digital electronic net-
works such as the Internet are not like railways and highways, nor are
they like their analog electronic forebears in telephony and broadcast-
ing. The generic properties of the new networks render them inherently
unfriendly to monopolies, hierarchies, and centralized control. The locus
of control migrates from systems operators to users. The movement from
single-purpose to multipurpose networks enhances the capacity for com-
petition. The century-old traditions of common carriage and public-
trustee regulation become unnecessary burdens, while both regulators and
systems operators deny that their expertise in regulatory gentlemen-
ship is no longer relevant.

The third chapter returns to the central question of the appropriate
role of the state in building and maintaining public networks. Despite the
American predilection for private ownership, the argument that there is
scant need for government involvement in the networking business finds
little precedent in economic history.

Chapter 4 focuses on the productivity paradox. The information infra-
structure, we argue, is the key to international competitiveness in the
information age. Networked information systems that work well become
the most important potential competitive advantage, although the con-
nection between information technology and productivity, it turns out, is
frustratingly difficult to demonstrate.
The fifth chapter analyzes a series of case studies in the recent history of America public communications to illustrate the paradox of the partially regulated and partially competitive markets for communications services. We review the painfully awkward and largely unintended federal trajectory toward deregulation of telecommunications, the parallel battles in radio and television deregulation, the computer network wars, and the continuing battle for control of wireless communications technologies.

In chapter 6 we return to our policy proposal for an Open Communications Infrastructure. We conclude that, based on the economic history and technological and political analysis presented in the preceding chapters, the Gordian Knot must be cut.
Political Gridlock

From a media consumer's point of view, everything is in its proper place. To listen to music or the news, there is a radio in the kitchen, beside the bed, and of course in the car. The TV set is in the den, with a smaller one in the bedroom. For a newly released movie, we go to the suburban multiplex. Like clockwork, these movies will appear next in the video store, then on cable and eventually on broadcast TV. Given the taken-for-granted natural order of the motion picture release cycle, one almost unconsciously calculates whether to go to the theater or wait until a new film is released on video or broadcast on television. Books can be found in the bookstore. Magazines come in the mail, sandwiched between advertising brochures. The newspaper reliably hits the front porch every morning before seven o'clock. The telephones in the kitchen and den stand at the ready. Nobody turns the system off at midnight so that sleep will not be disturbed. These media have become integrated into the rhythm of daily life in the industrialized world. Somehow accepted practices have evolved, dictating when and to whom a phone call is socially acceptable. The newspaper is read over morning coffee, the TV is turned on as soon as the dinner dishes are cleared up.

The modern newspaper has been with us since the 1830s, the telephone since the 1870s, magazines since the 1890s, radio since the 1920s, TV since the late 1940s. In each case, when a successful new communications technology evolved, it did so by wedging its way into the daily rhythms of human life. The popularity of television pushed the radio from the living room to the kitchen and bedroom, but not out of the house. Radio programming evolved from live comedy and drama to music, news, and call-in talk shows. There were only a few economic casualties
of this expansion. The advent of broadcasting, for example, put newsrooms and newspaper "extras" out of business. But in the end, the norms (and the underlying economics) of public communication have become crystallized and routinized. Each medium plays to its strength. A compact disc is optimized for the reproduction of high-fidelity music. One could have designed the telephone system for delivering broadcast high-fidelity music on demand, but the system instead was optimized for dial-up two-way voice communication.

The digital revolution in communications technology disrupts this relatively stable equilibrium of technology, economics, and human behavior. For the last 150 years, as new communications technologies were invented and introduced to the public, the successful ones were those that allowed their way to a place at the table. To protect themselves, they became differentiated. For the most part, they created de facto monopolies and reaped spectacular profits.

The communications revolution, however, has set off a technical explosion. Through digital processing, a single medium can offer all the services once provided by a range of media. Packaged and print media can move to electronic delivery; the telephone company can deliver multichannel television; the cable company can provide telephone service; and each of these formerly distinct services (along with other competitors) can provide electronic home shopping, electronic encyclopedias, magazines and newspapers—all delivered to high-speed home printers. What were once noncompeting, parallel, and highly profitable industrial sectors of the economy have all been thrown into the same electronic marketplace. The cash flow of this new industry will probably significantly exceed the combined totals of their individual predecessors. New forms of transaction and subscription services on top of traditional information and entertainment media will fuel this expansion.

Some observers predict that there will be a political and economic battle of unprecedented intensity among the giants of the global media, information technology, and telecommunications industries. International megacorporations like AT&T, IBM, Time-Warner, Disney, and News Corp are the hard-nosed, deep-pocketed survivors of previous battles in which they came to dominate one or more separate media markets. The high-power politics of jockeying for strategic position has
already started in earnest. Publicly, media executives are quick to express enthusiasm for the new electronic superhighway, but behind closed doors they acknowledge that the media revolution is a potential economic disaster they would have done well to avoid. Consumers meanwhile are a bit puzzled. They squint at the information highway, which to them looks suspiciously littered with hyped-up technologies. Many suspect that emerging technologies will make media costs go up rather than down, widening the gap between the information rich and the information poor.

Most consumers lose interest quickly when asked whether their television program came over analog or digital lines. Government officials are concerned, however, because they know that decisions about technical architecture translate into economic and political winners and losers. They anticipate the upcoming battle royal, but their role is ancillary. Caution politicians seek cover from the pressures of powerful forces, while a few brave ones pursue leadership roles to hammer out compromise. On the other hand, academics who study this field are ecstatic, because the communications turf war promises to offer one of the most interesting case studies of high-powered political-economic conflict ever—that is, the opportunity of an academic lifetime.

Our interest in this chapter is to introduce the key issues and themes surrounding the transformation of the political and economic life of the nation arising from the diffusion and growth of digital computing and communications systems. Some readers may be disappointed that we largely ignore the fiery debates and ferocious turf wars that result as the communications titans struggle to develop future markets while defending existing ones. Instead we present a long-term view of the evolution of information and communications technologies and services over the centuries, and draw from this picture what we hope is a simple conclusion: the time has come for an Open Communications Infrastructure. As we envision it, OCI promises to eliminate the political gridlock affecting information and communications technologies, and—if we may break our promise not to indulge in the political rhetoric of the moment—it will speed us along on the information highway toward the information-intensive society of the twenty-first century.

First we will introduce the players vying for control of the information and communications systems and the playing field of economic conflict
where gridlock is one of the most important weapons. We then address the question of global competitiveness, which turns out to be rather difficult to assess in real time as we battle through cyberspace and as economic activity becomes increasingly difficult to measure using traditional tools. We take up the issue of whether the United States is facing continued stagnation in its standard of living on an inflationary highway paved by low-wage workers, or conversely, whether the nation has dynamically restructured industry and raised productivity to enable future economic growth. These issues will be addressed in later chapters.

First, the clash of the titans—now playing in the halls of Congress, in the courts, in the marketplace, and in the media (if not at the local cinema)—will be reviewed.

The Clash of the Titans

Historical Precedent in Economic Conflict

Economic historians may counsel less scholarly enthusiasm and more hard-edged realism regarding the process of economic change: Large-scale economic turf wars, they like to point out, are in more than ample supply. In U.S. history the intersecting tensions in the industrial North and the agricultural South culminated in the Civil War, which some claim was as much about agricultural economic independence as it was about slavery (Walton 1994). Following the war, the westward expansion was marked by a battle between two agricultural sectors, cattle ranchers and farmers (Degler 1967). In the 1890s, the battle lines shifted to monetary policy. The conflict between forces in favor of maintaining a gold standard and those advocating the free coinage of silver was settled by the election of 1896 (Friedman 1963). The heat generated by this dispute, however, far exceeded the ultimate economic importance of its resolution in favor of a gold standard.

The nineteenth century witnessed technological change in the nature of networks, with the transition from roads and canals to railroads. After the turn of the century, technological change continued, from railroads to motorized trucking and ultimately air transport. In communications there was the introduction of the telegraph in 1844, and fifty years later the transition from telegraph to telephone. These developments brought
The railroad robber barons were the first large-scale exemplar of corporate capitalism. The centralized economic power of these new corporate entities was unprecedented, and the capacity of the government to respond to abuses and exercise legislative oversight predictably lagged for several decades. Significant federal legislation affecting the nature and future structure of U.S. transportation and communications networks took a long time to emerge. This legislation included the Interstate Commerce Act of 1887 and the Sherman Antitrust Act of 1890, which attempted to define the problem and establish the jurisdiction of the federal government in regulating such infrastructure (among other things), but which mandated little power of enforcement. The Mann-Elkins Act of 1910 and Clayton Act of 1914 after a century of laissez-faire policies finally put some teeth into federal enforcement. Realpolitik legislation during the 1920s consternanced AT&T's de facto hegemony for the next sixty years, but left sufficient grounds for continual antitrust challenges, culminating in the 1982 breakup.

In the 1990s, we are experiencing technical change in communications and transportation at a pace similar to that of the middle-to-late nineteenth century. The wild era of post-Civil War political economy rewarded aggressive and quick-witted economic entrepreneurship. This predictably led to abuses during the period of economic restructuring. Federal authorities only belatedly recognized the dramatic character of change, and responded still more slowly to the resulting political and economic distortions. We expect that drama to repeat itself into the twenty-first century: same play, new characters, modern dress.

In the following chapter we develop this argument and propose a historically self-conscious approach for appropriate, balanced, and realistic public policy in support of an Open Communications Infrastructure. But first, the players and the play should be formally introduced.

The Players
The would-be robber barons of the 1990s have considerable financial resources with which to expand and protect their empires. Table 1.1 roughly outlines the industrial sectors as they stand now, on the eve of convergence. The core industries represent about $400 billion a year in
### Table 1.1
Converging industrial sectors of the $400 billion information economy: Revenues preconvergence (1993 figures in $ billions)

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<th>Industrial sector</th>
<th>$134 Telecommunication</th>
<th>$124 Publishing</th>
<th>63 Broadcasting</th>
<th>53 Computers and data networks</th>
<th>20 Consumer electronics</th>
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gross revenues in the United States alone. As two-way electronics allows penetration into the neighboring turf of retail and information services, the estimate is expected to approach $1 trillion a year—roughly 20 percent of the U.S. gross domestic product (GDP). The other 80 percent of the economy is directly affected by the technical and market changes in information and communications systems, as we see for example when businesses turn to information technology in their effort to engineer new efficiencies into their manufacturing cycles. It is not difficult to see why corporate boards, CEOs, and strategic planners are attracted to the idea of having a significant portion of this enormous pie because their proprietary electronic real estate.
The Playing Field

There is a significant difference between the era of Gould, Morgan, and Carnegie and the present day. For most of the 1800s there was no federal regulatory tradition. Now there is not only a tradition, but a large number of turf-conscious bureaucracies and a comprehensive ideology of government oversight covering even the most far-flung communications industries. It may prove easier to invent new public-policy instruments than to reinvent or redirect existing ones.

In the current policy debate one frequently hears a plea for a level playing field. All we want, telephone, cable, and publishing executives are wont to claim, is to tip the paying field back to level, to correct the imbalance that currently favors the other guy. There are several problems with such a metaphor. First, there are dozens of industrial sectors involved in this political struggle. It is hard to imagine a field tipped in twelve directions at once. Second, the direction of the tip depends on where you stand. As with the greener grass on the other side of the fence, each player eyes competitors' turf with special envy. It is not just self-serving cynicism; the combatants come to view these inequities with both considerable emotion and sincerity.

Perhaps a better metaphor is the Prehelaemic model of heavenly motion. As our ability to measure the movement of the sun, the planets, and the stars improved, medieval astronomers stuck to their geocentric model, but they invented little subtheories to explain the anomalies. They observed brief periods of retrograde motion and postulated that planets moved not in a given orbit but in a tiny suborbit around an invisible object in the original orbit. After a while there were orbits around orbits--an unbelievably unwieldy and unlikely scenario. An astute astronomer might have sensed that the time was right for a paradigm shift.

Ultimately the heliocentric model of planetary motion resolved this problem and reintroduced a model of stability and refreshing scientific simplicity. We will make such an argument with regard to the current state of telecommunications regulation and the need for creating an Open Communications Infrastructure at the new paradigm.

For our current purposes, however, we want only to highlight the Prehelaemic character of the current system. After a century of laws written
to regulate grain elevators and railroads, which were edited to incorpo-
rate telegraphy, telephone, radio, television, satellites, and computers, 
then further embuffed by a higous century of accumulating case law, 
we have an awkwardly uneven legal playing field of Ptolemaic complex-
ity—playing field only a lawyer could love.

The accumulated inequities of the playing field are easy to demonstra-
t. Table 1.2 illustrates several examples of the current array of regulatory 
distinctions, ranging from subsidies to a variety of circumscriptions. 
These regulatory distinctions for the most part reflect the logic of the 
moment when these industries first emerged as identifiable business 
sectors. The earliest example was the post office. It made sense for the 
government to both provide service and encourage the free flow of infor-
mation and a rational sense of community, in spite of physical isolation 
across a sparsely populated continent, by subsidizing the conveyance of 
telegraphs, books, and magazines. The early days of newspapers were 
marked by robust competition, with over a dozen dailies available in 
many large cities. There was no need for regulation in such a market; 
indeed, the political tradition of the independence of the fourth estate 
and the First Amendment itself would seem to preclude it.

Broadcasting is more regulated, with provisions that guarantee the 
lowest possible advertising rates for political ads, and content regulated 
through prohibition of "offensive" content and requirements for chil-
dren's programming. The regulation of radio and television broadcast-
ing content was based on the "public trust" principle. The rationale 
was that since the public airwaves were provided to competing com-
mercial broadcasters without charge, there was nevertheless a public-
trustee obligation to abide by publicly determined content guidelines.

Figure 1.1
The demonstration of corporate power. Whether (a) Collin P. Pwovitgan's 
Southern Pacific Railroad, or (b) Bill Gates' Microsoft Corporation, neither the 
press nor the public tend to express warlike feelings about large corporations. The 
occipital thyme pieces. One might predict an over time correlation between 
occipital cortices and an energized attentional division within the Department of 
Justice. (a) Courtesy of the California History Room, California State Library, 
Sacramento, California. (b) Copyright © 1995 by the New York Times Com-
pany. Reprinted by permission.
<table>
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<th>Industry</th>
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<th>Subsidy</th>
<th>Rate. reg.</th>
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Broadcasters who violate the content rules can be reprimanded, fined, and ultimately have their broadcast license revoked.

Cable television systems were originally not regulated at all at the federal level because they do not use the radio spectrum. As their market penetration and economic importance rose in the 1960s, the Federal Communications Commission, at the behest of the broadcasting industry, simply declared that cable was "ancillary" to broadcasting and thus subject to FCC regulation—a declaration of authority ultimately sustained by the courts (Kellogg, Thorne, and Huber 1992). Given that cable service, unlike broadcasting, requires access to utility poles, cable
Table 1.2
Regulatory models of information industries: Government provision, subsidy, rate, and content regulation

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Companies are subject to contractual and regulatory constraints from local and state authorities. This local authority, however, was severely restricted by the Cable Act of 1984. Through the act the increasingly wealthy cable industry gained so much power and independence from competition and rate regulation that the resultant rise in cable rates generated one of the most curious legislative turnabouts—the Cable Act of 1992, which attempted to roll back and deregulate cable rates. In this curious political history nobody got around to regulating cable’s potentially offensive content. The logic was that broadcasting through the airwaves is somehow “invasive” and should be available to all without charge. Cablecasting requires the customer to proactively order and pay for the service, and thus one can simply disconnect it in the event of perceived offense.

Because telephone service was judged to be a natural monopoly, the government agreed in 1913 to forbid new competition against AT&T. In return AT&T accepted federal rate regulation as a guard against the prospect of monopolistic tariffs. With the tradition of common carriage, however, telephone carriers, unlike broadcasters, were not responsible for the content of what was carried over the system. This precludes the use of content-oriented regulation. The need for telephonic content regulation started to gain supporters in the 1980s as commercial adult-oriented services sprang up, and both federal and local regulators decided to promulgate rules for restricted access to these kinds of services.

The absurdity of the current system can be illustrated by examining the possible regulatory constraints on a single message as it might pass through different media of mass communication. For example, established copyright laws work well with the established print model, but they break down with electronic publishing. Computers can alter text in an electronic form through a simple computer program, but it is unclear if a computer is guilty of copyright infringement. Can a computer author copyrighted material (Pool 1983)? It turns out that whether the message is transmitted electronically or in print matters a great deal to the courts and regulators. It may be of little consequence, however, to the sender or receiver, except for the regulatory impediments. Eliminating this uneven playing field, which distorts and inhibits communication, is a principal
reason for adopting the Open Communications Infrastructure regulatory model.

The Rhetoric of Gridlock
We have witnessed an interesting transition in the rhetoric of competition among the communications industries over the last several decades. We identify three stages.

The first stage, spanning much of the first half of the twentieth century, might be characterized as one of sectoral independence. Each communications industry had its own turf, and the boundaries were clear-cut. There was some competition across sectors—for example among publishers, broadcasters, and telephone yellow pages for advertising revenues—but the focus of competition was within each sector (magazines versus magazines, one radio station versus another). The measures of industrial success and failure were industry-specific—Nielsen ratings, circulation figures, telephone penetration. The rhetoric was low-key, even polite.

The second stage emerged in the 1980s, reflecting a growing recognition of the prospects of meaningful cross-sectoral conflict and competition. It was also characterized by a rush to the barricades. The impulse was to protect sectoral boundary lines. One of the most intriguing incidents was the standoff between the newspaper and the telephone industries. Newspapers derive 30 percent of their income from the sale of classified advertising, and they recognized that dial-up information services and computer bulletin boards threatened to make significant inroads into this income stream. The American Newspaper Publishers Association (now renamed the Newspaper Association of America) set up high-level committees to plot strategy and lobby Congress for protection. Basically, they argued that permitting telephone companies to enter the information service business would put newspapers out of business. Similarly, the Regional Bell Operating Companies (RBOCs) were to be kept out of long-distance and manufacturing businesses for fear of the negative consequences they would produce for their competitors. The political maneuvering was intense and the rhetoric zero-sum, but both remained largely out of public view.

The third stage, the battle of survival, follows a change in strategy in which the sectoral players acknowledged that there was going to be a technological shift and that an advanced electronic network would be built. But now each sector claims that it alone is qualified to build it. Each claims that there is no need for the competitor's network. Each claims to have a better technological platform to get the job done, and each also claims that the other will function as a monopolist. The telephone company, the cable company, and the computer-network company each imagine a single high-capacity network in the future, connecting every firm and every household. It would be wasteful, they argue, to build more than one network. It is true, of course, that advanced technology permits virtually all of the services under discussion to be provided by a single network. The battle for survival is over who will ultimately own this proposed single, universal, high-capacity network, forcing all the others to do business on its turf. Because each of the major players dreams of owning this great engine of economic power, they are all inclined to argue for the "special efficiencies" of the single-network model, while at the same time warning of the evil intentions of the others.

Examples abound. Robert Kayner, then executive vice president of AT&T, gave a keynote address at the 1994 consumer electronics industry trade show. Stay away from the cable industry for the provision of interactive services, he warned. "They will act as gatekeepers, restricting what goes into homes over the emerging information highway. Working with the cable industry is like picnicking with a tiger; you might enjoy the meal, but the tiger always eats last. The cable industry threatens the very existence of the consumer electronics industry because of cable's stranglehold control on the set top box" (Carlson 1994). A month later the cable industry filed an FCC petition asking that Pacific Telesis (PacTel) be forbidden from offering advanced services on its proposed $16 billion high-speed video and data superhighways. Why? Because the construction would be unfairly subsidized by telephone customers paying higher phone bills. PacTel responded, "They are trying to use the regulatory process to impede competition in their marketplace, at the same time they are trying to get into our marketplace." "This is about survival," they added (Adelson 1994).
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The survival of many firms in a large number of information industries is now threatened as market share, technology, service design, and network architecture shift seemingly minute to minute. New cross-sectoral research, standards, production, distribution, and marketing alliances are announced daily, while others are renounced quietly. And the battle does not stop at the water's edge; rather, it is fueled by global communication links.

The War's Second Front

Thus far we have characterized the clash of the titans primarily as a battle among domestic industrial groups that seek economic dominance. Still, we live in an age of increasingly interpenetrated national economies and multinational corporations. Goods, services, and people cross international boundaries with increasing ease, speed, and frequency. Economic integration in Europe, Asia, and the Americas takes on new significance. The communications revolution is both a central cause of globalized economics and the central playing field on which economic competition among nations takes place. In the information age, if one nation or region manages to attain significant control of the electronic playing field, it will have achieved a remarkable competitive advantage. Such questions attract considerable attention in Europe, Asia, and the Americas. Analysis in each region alternatively fantasizes about the prospect of their own success in seizing dominance, and fret over the dire possibility that others will.

In 1988, Richard Munro, the chief executive officer of Time Incorporated, pondered the future as the unprecedented Time-Warner merger was being finalized. In one public statement he mused, "By the end of the decade there will probably be only four or five dominant media conglomerates" (Bagdikian 1989). This is not the sort of thing one wants to draw to the attention of the Justice Department, but his candor is refreshing.

American Chaos versus Coordinated Efforts in Japan and Europe

Concerns about the American communications infrastructure are deepened by the realization that extraordinarily well-financed, coordinated plans for system enhancement are being undertaken in Europe and Asia. As early as 1972, the Japanese government circulated its report, The Information Society: A Year 2000 Japanese National Goal. It outlined a stepwise plan of advanced techniques for manufacturing semiconductors and building national data networks and database technologies. In 1981, Nippon Telegraph and Telephone (NIT) put forward a plan for an information network system (INS). In 1984, the Ministry of International Trade and Industry (MITI) announced a complementary plan for advanced communications systems in model cities. In 1985, the New Telecommunications Law established a dramatic new process for deregulatory reform and system development. In 1987, the Private Sector Vitality Act provided additional tax preferences and interest-free loans for telecommunications infrastructure development and research projects. These coordinated policies and their recent revisions are expected to result in a $250 billion investment in Japanese infrastructural development. Many other projects have sought to improve Japanese competitiveness in related electronics industries, such as semiconductors, and in some cases they have succeeded.

The European situation is similar. In this case the seminal document is the French government's Note-Mime Report of 1980, which called for massive enhancement of the French network by expanding telephone penetration, the highest percentage of digital switching, and the largest packet-switched network in the world. There were parallel projects in England, which included the establishment of a new independent government agency, OFTEL, whose mission is to promote advanced telecommunications development. In Germany, the Witte Report, Restructuring of the Telecommunications System, was released in 1987; it was followed by the restructuring of the Bundespost and the opening of a number of markets to competition. Plans for privatization of Deutsche Telekom are progressing. By 1997, the most modern network in the world will be installed throughout the former East Germany, with the hope that this advanced information infrastructure will rapidly raise the living standards and the quality of life of people in the region.

These national initiatives are coordinated with European Union (EU) efforts including: the European Strategic Programme for Research in Information Technology (ESPRI'T); Advanced Communications Technologies
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These national initiatives are coordinated with European Union (EU) efforts including: the European Strategic Programme for Research in Information Technology (ESPRIT); Advanced Communications Technologies
and Services (ACTS, formerly known as RACE); and the industry-initiated EUREKA program for advanced technologies. These projects have yet to demonstrate the effectiveness in bringing new products to market through the harmonization of European standards and cross-border research and development collaboration.

Global Competition and American Decline?

The concern over the state of the United States’ physical and electronic infrastructure has been drawn into a broader debate between two schools of academic internationalists—the “declinists” and the “traditionalists.” Books such as The Reckoning (Halberstam 1987), Trading Places: How We Allowed Japan to Take the Lead (Prestowitz 1988), and The End of the American Century (Schlossstein 1990) have been written by the declinists. The traditionalists have responded with The Myth of America’s Decline (Nau 1990) and Born to Lead (Nye 1990). There is agreement that the U.S. position in technology, trade, and economic productivity declined relative to that of Europe and Japan; but the real debate is whether the problem justifies major changes in the way the United States runs its economy and policy, or is a result of a U.S. industrial restructuring leading to resurgent competitiveness.

Let us take a look at the numbers. The U.S. trade deficit has indeed grown, and the United States went from being the largest creditor to the largest debtor nation in the world, reversing sixty years of investment in only four years. Despite attempts from the administration and Congress to respond to the challenge, the trade deficit continues to accumulate at a rate of about $100 billion per year (Krugman 1990).

The U.S. share of world manufacturing fell from 33 percent in 1950 to about 23 percent in the 1980s and 1990s. Productivity growth, which held strong from 1900 to 1970 at an average of 2.3 percent (2.8 percent in the 1950s and 1960s) fell precipitously to 1.2 percent in the 1970s and 1980s, while preliminary data for the 1990s looks more encouraging. If the United States had been able to maintain the original rate of productivity growth through the decades, living standards for American workers would be fully 25 percent higher than the levels that have actually been achieved. In fact, measured in real dollars, the wages of American workers have fallen since the 1970s, putting economist Paul Krugman in a position to note with some irony that “the last real increase in wages came at about the time of Nixon’s first inaugural” (Krugman 1990). Workers in Japan and Europe during the same period experienced demonstrable increases in their standard of living. Such patterns are no mystery. The fundamental economics tell the story. U.S. manufacturing productivity growth from 1960 to 1986 was only about half that of Japan, Germany, France, and Italy, and below that of England and Canada (Krugman 1990; Nye 1990; Office of Technology Assessment 1988). In the 1990s, early indications of renewed U.S. productivity growth appeared, but it is too soon to say whether a reversal in national productivity growth trends will be sustained.

The MIT Commission on Industrial Productivity (Dertouzos 1988) studied manufacturing and trade from 1971 to 1987. The commission documented the decline and noticed that by the end of this period, a significant negative balance of trade existed in all but two. Even though the United States has continued to perform well in software and services, many consider the semiconductor to be the engine of the information age. The decline of American participation in memory chips is among the most dramatic. Prestowitz (1988), for example, reports that in only seven years (from 1980 to 1986) the United States and Japan literally traded places. In 1980, the United States had 75 percent of the market, whereas Japan had 25 percent. By 1986, Japan had 65 percent, the United States had 28 percent, with Europe and the Pacific rim manufacturers holding the balance. For memory chips, Japan dominated 92 percent of the market (Ferguson 1988) although Intel and other U.S. producers dominate high-value-added markets for central processors and other chips. Perhaps the most significant fact of all is that national per capita income in the United States has been stagnant since 1973. Although we do not want to pursue this further here, it is worth keeping in mind as we consider how to move the nation forward with new rules of the game for the information economy.

The traditionalists, for the most part, do not deny the numbers; for them the difference is in the interpretation. They are concerned that an
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The traditionalists, for the most part, do not deny the numbers; for them, the difference is in the interpretation. They are concerned that an
overreaction to economic cycles and the emotionally charged term of “decline” itself will lead to the premature abandonment of sound policy principles of free trade and private-sector-dominated economic management. We agree that if the perception of decline leads to narrow protectionism, abandonment of international responsibilities, and a reflexive propping up of manufacturers in economic difficulty, such ill-considered responses would indeed hasten further decline. We are equally persuaded, however, that to coast along confidently without carefully examining strategic options in light of developments would be equally ill-advised.

One of the central themes of much of this literature is that the communications, computation, and information industries will be at the forefront of the battle for international economic predominance. It turns out that the relationship of information technology to industrial productivity is highly complex—and one we will address in a later chapter. Our present concern is the evolution of the U.S. policy position vis-à-vis the relationship of information technology and economic health. It turns out that two dramatically different positions have been taken—the laissez-faire approach of the Reagan-Bush era and the National Information Infrastructure initiative introduced by Clinton and Gore.

The Evolution of U.S. Communications Policy

Our particular interest is on the role of the information infrastructure in the communications age. The position of this infrastructure is central to the nation’s development. The analysis here points out the historical parallels between the expansion of the canals, railroads, and highway systems in the industrial revolution in the United States, and the need for a comparable public network of electronics and optics today. The National Telecommunications and Information Administration (NTIA), for example, in introducing its comprehensive overview of this issue, notes that:

The U.S. economy is becoming increasingly dependent on the provision of services that require efficient distribution and dissemination of information. Over 50 percent of all U.S. workers are currently employed in information-intensive service industries that are heavily reliant on telecommunications. Even traditional manufacturing firms increasingly depend on the swift movement of information from headquarters to factories to distribution points to customers in order to remain competitive with their domestic and foreign rivals. This transformation has heightened the importance of telecommunications to the nation’s economic and social well-being. Many now believe that the telecommunications infrastructure will be as important in the future as the transportation infrastructure has been to the industrial economy. (National Telecommunications and Information Administration 1990, p. 5)

There is a concern, however, that our telecommunications infrastructure is less than it should be.

The Davidson-Selwyn Debates

William Davidson of the University of Southern California filed reports with the FCC and NTIA documenting that “while the United States has been a leader in many aspects of public telecommunications, its lead has narrowed or disappeared altogether in a number of critical areas.” He noted that the United States trails France, Canada, the United Kingdom, and even Hong Kong and Singapore in digital switching of local-exchange service. He found that total U.S. investment in public infrastructure actually declined in the late 1980s, and that levels of sustained infrastructural investment in the United Kingdom, Japan, Switzerland, and Germany exceed U.S. levels by 50 percent to 150 percent (1990a). His work is supported by the Regional Bell Operating Companies and is frequently cited as evidence of the need for regulatory relief for the public-switched network.

Veteran analyst Lee Selwyn and his colleagues at Economics and Technology, Incorporated, writing for the International Communications Association and representing the telecommunications user community, are skeptical. They utilize different measures of system performance and different exchange rates for the calculation of relative infrastructure development and conclude that the United States remains far ahead of the pack. Davidson responds that these numbers are out of date, contending that they ignore the downward trend and that Selwyn’s exchange rate calculations distort the national comparisons (Montgomery, Selwyn, and Keller 1990).

We cite this controversy not to debate the technical merits of alternative measures of system performance, but merely to note that the issue
overreaction to economic cycles and the emotionally charged term of
"decline" itself will lead to the premature abandonment of sound policy
principles of free trade and private-sector-dominated economic manage-
ment. We agree that if the perception of decline leads to narrow protec-
tionism, abandonment of international responsibilities, and a reflexive
propping up of manufacturers in economic difficulty, such ill-considered
responses would indeed hasten further decline. We are equally per-
suaded, however, that to coast along confidently without carefully ex-
amining strategic options in light of developments would be equally
ill-advised.

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American Policy Paralysis

How can U.S. industry and the nation’s citizens respond to these challenges? Should a partially revised law dating from the 1930s continue as the guiding policy statement for communications into the 1990s, given the policy paralysis we currently face? Is the Telecommunications Act of 1996 a sufficiently radical reform to move the United States beyond policy gridlock?

Stalemate at a New Level

As a worst-case scenario, we may find that the telcos, broadcasters, cable industry, private radio and consumer electronics manufacturers, computer companies, and publishers, although they all have their eyes on their neighbors’ markets, opt to stick with what they know best and protect their cash flow, sunk costs, and existing plant and choose to challenge and undercut the deal of 1996. In the wake of the Telecommunications Act of 1996, litigiousness is rampant, and ingenious new forms of legal foot-dragging are invented. Meanwhile, the administration and Capitol Hill continue to be paralyzed by intense cross-pressures.

Under this scenario, new technical standards committees proliferate as their function shifts from setting standards to blocking them. Each vendor continues to believe that it can outmaneuver all the others into adopting its own proprietary technology as the accepted technical standard for interconnection, and to that end resists cooperative efforts. The FCC bows to industry pressure and attempts to conduct technical tests to pick the best technology based on “objective technical criteria.” The testing process is conducted and controlled by industry consortia because the FCC lacks funding. The tests take forever, and the test results are ambiguous. Half of the vendors take the FCC to court to demonstrate that the tests are unfair. None of the tests has any relevance anyway, because by the time the testing is completed, a new generation of technology has been developed.

In a less stark scenario, we may find that the 1996 act provides for a modest step forward and, despite the efforts of some industry stalwarts, the technology prevails. The local-exchange companies lose their battle against bypass. Local television and radio broadcasters lose their local monopolies as satellite and terrestrial spectrum, coaxial, twisted pair, and fiber wireline each come to offer equivalent services.

There are three problems with this version of the future. First, it significantly delays the development of an advanced, programmable network, with the attendant disadvantages to economic efficiency and productivity. Second, it builds an interoperable network out of pieces explicitly designed not to work that way, leading to inefficiencies and operational awkwardness. Third, and perhaps most important, policy gridlock threatens to hold U.S. companies back from the cutting edge, and effectively abandons the field of integrated communications to Europe and Japan.

The Japanese, on the other hand, have a well-integrated game plan. They have harnessed the Japanese zaibatsu tradition, involving a complex pattern of intercompany cooperation and competition, with dramatic success. In Japanese culture, it is a strongly held belief that because the nation is small and relatively poor in natural resources, it must have a highly coordinated and aggressive strategy for economic survival in an increasingly competitive global economy.

The Europeans also have a game plan. It is even more complex than Japan’s because it involves the painful economic reorganization of a weak, fragmented array of countries into the largest, most powerful unified economic and political entity in world history. It has had a rocky start and has taken decades to develop, but the direction of European integration is no longer questioned. However different the Japanese and European approaches are, one thing is clear: Both heavily emphasize the strategic importance of communications infrastructure to economic productivity.

Does the United States have a game plan? Throughout the Reagan and Bush administrations, the traditional U.S. aversion to industrial policy led to a pronounced and public disavowal of any such thinking (Seib 1990). Behind the scenes, however, there was active discussion between the public and private sectors as white papers were drafted and conferences organized. The format reflected the traditionally stealthy U.S.
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The atmospheres are right. The emphasis on health and educational applications reflect traditional government concerns. The emphasis on promoting commerce and job creation build on the success of the Interstate Highway Act and the Information Superhighway metaphor. Tied in with the rhetoric and publicly announced intent of the Telecommunications Act of 1996, the game plan should be complete and effectively positioned. But we remain concerned. The NII initiative is retreating to the background as the presidential campaign of 1996 takes center stage and the Telecommunications Act threatens to resurrect more regulation rather than less.

This is not to minimize the importance of the Clinton administration's leadership in initiating public discussion (and cross-agency dialogue) on information infrastructure issues. The administration's initiative energized industry and motivated governments worldwide, as well as at the state and local level, to consider how new networking technologies and services might affect them and their constituencies. Combined with the federal re-engineering initiative, the National Performance Review (also chaired by Al Gore) may lead to a more responsive, efficient, and connected federal government, which in turn may be a legacy of the Clinton administration's National Information Infrastructure initiative.

A Case Study in Political Economics

Political economy is the interdisciplinary study of the interaction of political and economic systems. Much of the work in this field focuses on how market failures of various sorts may require explicit intervention of the polity to protect the environment, provide a social-welfare safety net, constrain monopolistic practices, and so on. From another direction, scholars may study how economic incentives and influences distort an otherwise open process of political decision-making.

This book is a study of a historical transition currently in progress as an array of communications industries, once largely regulated and monopolistic in structure, move into an era of deregulation and competition. It represents rich soil for the political economist. One can draw on an extensive theoretical base and a diverse collection of historical parallels and contrasts to better understand the current policy debate. One can also contribute to the developing theory by means of a close examination of a particularly dramatic case. We will try to do a little of each.

To put our position in perspective, we draw on the vocabulary of international relations, which organizes much of its scholarship over the last century around the polarities of idealism and realism. Briefly summarized, the idealists emphasize the potential of extranational institutions and international law to promote international cooperation and reduce the likelihood of resorting to military means for resolving differences among nations. In contrast, the realists—a somewhat more cynical lot—argue that international conflict is fundamentally inevitable, and
that a naive faith in well-intentioned diplomacy is likely to be counterproductive and may lead to misperceptions about the motives and intentions of likely adversaries.

The industrial policy debate can best be understood through the lens of these polarities. Both the free-marketeers and the industrial policymakers have mirror-image realistic and idealist world views. Free-marketeers have an unshakable faith in the capacity of marketplace mechanisms to allocate resources efficiently, and they have an equally unshakable cynicism about the ability of government experts to pick winners and allocate resources. Industrial policymakers, on the other hand, see themselves as realists in their view of the marketplace. They consider industrialists astute profiteers who would distort the marketplace to maximize profit and restrict competition, were they permitted to do so. The job of government is to hold these players in check, according to this view, and industrial policy advocates exhibit faith and enthusiasm about the ability of government agents to effectively perform that role.

We characterize ourselves as being similar to the realists in outlook: we are deeply cynical students as a result of our study of this dramatic transformation of the communications industry and its roots in the last century and a half of government-industry interactions. We have little faith, however, in either would-be regulators or would-be industrialists to lead us to the information highway promised land. Put bluntly, given the opportunity, both would screw it up.

Regulatory systems work best when the industrial and technological structure is stable, the inputs and outputs easily measured, and the public welfare goals clearly identified. None of these properties are evident in this case. For their part, markets work best when competitive entry and exit is easy, competitive services are straightforwardly comparable, costs and prices are evident and comparable, scale and scope economies are limited, and buyer and seller have equivalent expertise. None of these properties is evident here.

Furthermore, the likely compromise of a half-regulated, half-competitive system of communications networks may actually be worse than either by itself. In our view, many proposals for reform threaten to absorb the worst of both worlds; the economic distortions of the regulatory process and the regulatory distortions of the competitive process diminish the effectiveness of both, while dramatically slowing the pace and reducing the incentives for technical progress. We use the word "halfway" to characterize the mixed nature of these proposals; most of the proposals and analyses we have seen thus far appear to fall into the halfway trap. Halfway proposals by design reach but halfway to their conflicting goals. They are trying mightily to unseat the Gordian Knot one strand at a time, and it will never work.

The policy gridlock must be addressed dramatically by means of a clear and distinct policy initiative. Such an initiative presumes that regulators are ill-equipped to micromanage such fast-moving technical developments. It also posits that industrialists, who for the most part have enjoyed a century and a half of near-monopolistic profitability, will do everything they can to recapture and monopolize the new network structure. Some media executives seem to perceive it as something akin to a natural right, others perhaps simply as sound business practice. In any case, the laissez-faire approach of leaving the transition to market forces alone is a recipe for disaster.

There is a role for proactive government involvement in managing the transition from a regulated system to one that is truly competitive. But policymakers must abandon the regulations on entry and exit, on prices, and on mandated services at the outset, and focus on nurturing and protecting meaningful competition.

Open Communications Infrastructure

Because this study draws together historical and economic analysis and presents explicit advocacy of a particular position in the communications policy domain, it seems appropriate to signal where we are headed at the outset. In the spirit of the communications field, where power is measured by the obscurity of one's acronyms, we feel compelled to develop an acronym that captures the essence of our argument. In public presentations over the last several years we have come to rely on the phrase "Open Communications Infrastructure." "Open" captures the spirit of our call to move quickly away from a regulated common-carriage system to a competitive, privatized, interconnected system of systems. Our proposal would reflect a traditional and conservative slant if we went no
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further. But "infrastructure" emphasizes the public character of this evolving network and the need for close public scrutiny, proactive government involvement, and safeguards for protection against market failure and the underallocation of resources for public goods. The term "communications" in the middle of our phrase, as its root meaning suggests, is the common element that, by its nature, links the otherwise disparate terms "open" and "infrastructure." The nature of the evolving technology in this domain, we argue, is best served by privatized and competitive provision; but the nature of communications—the common, the agora, and the public space—is inherently and inevitably public, and, unlike the provision of cardboard boxes or canned peas, requires special attention. The confluence of these two domains in communications policy, we assert, requires a new approach.

Table 1.3 outlines four traditional models for regulation in the communications field, arrayed from the most active to the least active role for government. In reviewing that array, it seems appropriate to position OIC next to the middle. Most of the world's nations saw fit to provide postal, telecommunications, and broadcasting systems as government monopolies. The United States was one of the few nations with a private broadcasting system. (Less than 20 percent of the world's nations, most of them in Latin America, had private broadcasting systems until the 1970s.) The United States was virtually alone in choosing a private telecommunications system. As the forces of technology and globalization exert pressure on other nations to move toward private provision, one might imagine that the experience and regulatory tradition of the United States would prove to be a comparative advantage. But this is not necessarily true, for it depends on whether the historical traditions of the "Postal, Telegraph, and Telephone" mindset or of the common-carrier and public-trustee mindset will be the most difficult to break through.

Common carriage, as we have noted, puts both federal and local government in the role of arbitrator of rates, guarantor of universal service, and general overseer of means and methods. It is a delicate and often frustrating mechanism for both parties—the regulators and the regulated. The system infrastructure is horrendously complex, and regulators are heavily dependent on information provided by the communications companies to determine rules and tariffs.

The public-trustee model derives from the American experience in private broadcasting. The logic dictates that private vendors in limited competition can provide better service than can a publicly managed system. Because the spectrum is a public resource, however, in order to maintain their access to it, broadcasters would need to demonstrate their responsiveness to the public "interest, convenience, and necessity" at regular intervals. For much of the history of American radio and television broadcasting, station managers conducted pro forma audience surveys, filled out forms about news and public affairs programs, ran editorials, and kept technical logs as part of a sham process of oversight. Virtually no stations lost their licenses for failing to serve the public interest. A few had their licenses revoked for illegal behavior and blatant disregard of technical regulations. But the public-trustee tradition does provide a model for content regulation, as regulators keep a close eye out for violations of decency, political access, and right-of-reply regulations. It is a curious mix of legally limited competition, based on the presumption of spectrum scarcity, cyclical bureaucractic attention to content rules of varied vintage, and a codified disregard for the underlying economics. Proponents of deregulation are unlikely to tout the public-trustee concept

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<td><strong>Public role</strong></td>
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<td>Ownership and management of monopoly system</td>
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further. But "infrastructure" emphasizes the public character of this evolving network and the need for close public scrutiny, proactive government involvement, and safeguards for protection against market failure and the underallocation of resources for public goods. The term "communications" in the middle of our phrase, as its root meaning suggests, is the common element that, by its nature, links the otherwise disparate terms "open" and "infrastructure." The nature of the evolving technology in this domain, we argue, is best served by privatized and competitive provision; but the nature of communications—the common, the agora, and the public space—is inherently and inevitably public, and, unlike the provision of cardboard boxes or canned peas, requires special attention. The conjuncture of these two domains in communications policy, we assert, requires a new approach.

Table 1.3 outlines four traditional models for regulation in the communications field, arrayed from the most active to the least active role for government. In reviewing that array, it seems appropriate to position OCI near the middle. Most of the world's nations saw fit to provide postal, telecommunications, and broadcasting systems as government monopolies. The United States was one of the few nations with a private broadcasting system. (Less than 20 percent of the world's nations, most of them in Latin America, had private broadcasting systems until the 1970s.) The United States was virtually alone in choosing a private telecommunications system. As the forces of technology and globalization exert pressure on other nations to move toward private provision, one might imagine that the experience and regulatory tradition of the United States would prove to be a comparative advantage. But this is not necessarily true, for it depends on whether the historical traditions of the "Postal, Telegraph, and Telephone" mindset or of the common-carrier and public-trustee mindset will be the most difficult to break through.

Common carriage, as we have noted, puts both federal and local government in the role of arbiter of rates, guarantor of universal service, and general overseer of means and methods. It is a delicate and often frustrating mechanism for both parties—the regulators and the regulated. The system infrastructure is horrendously complex, and regulators are heavily dependent on information provided by the communications companies to determine rules and tariffs.

The public-trustee model derives from the American experience in private broadcasting. The logic dictates that private vendors in limited competition can provide better service than can a publically managed system. Because the spectrum is a public resource, however, in order to maintain their access to it, broadcasters would need to demonstrate their responsiveness to the public "interest, convenience, and necessity" at regular intervals. For much of the history of American radio and television broadcasting, station managers conducted pro forma audience surveys, filled out forms about news and public affairs programs, ran editorials, and kept technical logs as part of a sham process of oversight. Virtually no stations lost their licenses for failing to serve the public interest. A few had their licenses revoked for illegal behavior and blatant disregard of technical regulations. But the public-trustee tradition does provide a model for content regulation, as regulators keep a close eye out for violations of decency, political access, and right-of-reply regulations. It is a curious mix of legally limited competition, based on the presumption of spectrum scarcity, cyclical bureaucratic attention to content rules of varied vintage, and a codified disregard for the underlying economics. Proponents of deregulation are unlikely to tout the public-trustee concept

Table 1.3 Five regulatory traditions

<table>
<thead>
<tr>
<th>Paradigm</th>
<th>Public role</th>
<th>Private role</th>
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<tbody>
<tr>
<td>Public ownership</td>
<td>Ownership and management of monopoly system</td>
<td>Manufacturing only</td>
</tr>
<tr>
<td>Common carriage</td>
<td>Heavy regulation of entry, exit, tariff and management procedures</td>
<td>Ownership and management of monopoly system</td>
</tr>
<tr>
<td>Open communications infrastructure</td>
<td>Regulation focuses on maintenance of competition and spectrum allocation</td>
<td>Ownership and management of competitive system</td>
</tr>
<tr>
<td>Public trustee</td>
<td>Light regulation of procedure, initial regulation of entry</td>
<td>Ownership and management of quasi-competitive system</td>
</tr>
<tr>
<td>Laissez-faire</td>
<td>Minimal regulation of business practice</td>
<td>Ownership and management, level of competition not determined</td>
</tr>
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as the model for the future, but it does offer a useful exemplar of the difficulty of a heterogeneous system in which regulators are charged with monitoring only a narrowly specified set of behaviors of an otherwise unregulated collection of oligopolies.

The laissez-faire model is the ideal to which all policy analysts might otherwise aspire, relying on the marketplace and open competition to hold down prices, spur innovation, and maintain service quality—but it only so easy. The problem of course is the diversity and perversity of market failures—anti-competitive collusion, incomplete market information, distorted transaction costs, and a variety of non-economic social and political goals underserved by market allocation. These market failures become especially difficult to unravel given the peculiar characteristics of networks: their positive network externalities, the critical importance of interfaces, and their diversity of use.

We focus on the issue of anti-competitive collusion reminiscent of the robber-baron era and put forward a new paradigm of regulation that sets as its goal the maintenance and protection of competition. We identify a series of private mechanisms to deal with incomplete market information and distorting transaction costs. We set aside the issue of other social goals as one best addressed as a matter common to all sectors and not limited to communications.

Perhaps our strongest case is our critique of the halfway evolution of partially regulated communications systems—the worst possible combination of unstructured quasi-random regulation and quasi-unregulated monopolies.

The central elements of the OCI model are:

1. **Open architecture.** The future of the network is digital. Voice, text, data, and images will be transported by electrons and photons in digital format. Some messages will require extensive bandwidth, others will not. All communications systems, spectrum- or wireline-based, have the potential for two-way interconnectivity. Some applications such as broadcast-style video may be predominantly one-way, but there is no reason to design the architecture so that two-way communication is precluded (which is true in today's radio, television, and cable delivery systems). At the heart of this approach is flexibility, or the design of a system that facilitates interconnection among different systems and services today and as they develop over time. By emphasizing interconnectivity and interoperability, incentives in innovation shift from trying to protect licensing revenues (by means of a proprietary technical communications standard or inherited spectrum allocation) to encouraging economies of scale in efficient manufacturing and service provision.

2. **Open access.** The currently dominant model of communications economics is based on a presumption that limited spectrum and inefficiencies of the competitive provision of wireline communications services require legal barriers to competitive entry and regulatory oversight of the legally designated monopolies. This premise, however, is outdated. The critical turning point occurred first in voice telephony, and will occur soon in radio and in video. Ironically, we see the turning point first in Eastern Europe and the developing world, where the need for building telecommunications is most urgent. Wireless access to the local loop, in many cases, turns out to be fully competitive with wireline provision, but the use of wireless access to the network has other properties, especially in cellular and micromesh applications.

The critical property, we argue, is the lack of steep economies of scale in service provision. To offer universal wireline service from the outset, one must wire every street on every block. To offer cellular service, one can start on a small scale. For fewer customers, fewer cells are required. As service demand grows, the number of cells expands gradually and efficiently, without requiring additional bandwidth. Other properties of course include the mobility and flexibility of personalized communications service. In this way, the promise of Open Communications Infrastructure is in part an anticipated artifact of cellular and personal communications network (PCN) technology. Wireless access to the local loop makes open competition in provision of local-exchange service a meaningful prospect.

3. **Universal access.** The principal element of the landmark Kingsbury Commitment of 1913 was a horsetrade. AT&T chief executive officer Theodore Vail was willing to put the entire AT&T network under the control of federal common-carrier regulation in return for protection from further competition. Part of the deal, however, was Vail's commitment to deliver on universal service, with cost averaging; and for the most part, the system he built delivered what was promised.

The deregulation of communications at this juncture raises fears that less privileged and more remote communities will be deprived of access—that competitive provision will lead to the decline of universal service.

Critics, for example, point to the deregulation of airlines and the resultant changes in the cost and quantity of service to remote areas. It is at this point, however, that the transportation-communications parallel
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4. Flexible access. An interconnected and interoperable network of telecommunications, broadcasting, and electronic publishing breaks down a number of traditional distinctions. In OCI, one can make a call on the cable, send a fax over the radio, and watch television from the telephone line. The format will be digital. The bandwidth will be adjusted according to the demands of the user and the character of the communications. A teenager may not require high-speed and sophisticated data communications to manage a bank account, so the terminal can be simple and inexpensive, and the demand on the network small and economical. Viewers who are casual about the quality of the picture and the release date of the movies they watch on TV can opt for the least expensive display, lower-bandwidth provision, and older movies on an advertising-supported "free" channel or lower-cost pay-per-view. Viewers who are video aficionados with the latest equipment may demand the most sophisticated high-bandwidth signal and recently released programming. Such distinctions need not be legislated: a truly competitive market will provide more diversity than the law could imagine. But the fundamental flexibility and interoperability in communications architecture is not an inevitable outgrowth of current market dynamics. The role of public policy in defining the nature of the market is critical.

The Telecommunications Act of 1996

In the preface we described ourselves as war correspondents, trying to make sense of the industrial battle of the titans as jockeys, broadcasters, telcos, computer companies, and new players try to jockey for position, steal their competitors' business, or at least survive with a viable piece of the market they now dominate. They combat each other in the marketplace when permitted, but even more often the fight takes place in the corridors of power in Washington, as they seek to prevent competitors' entry into their traditional markets.

As this book was being written, the battle raged on and ultimately crystallized around a single, massive piece of legislation, Public Law 96-104, or the Communications Act of 1996. Each week through 1994 and 1995, there would be fresh conflicting predictions that the evolving bill would succeed or become mired in legislative gridlock. But as it turns out, act or no act, policy gridlock continues. In fact, the illusion of a policy of competition and deregulation created by some of the bill's sponsors makes our arguments all the more important.

There is no doubt that the act is a landmark piece of legislation for the twenty-first century. Unfortunately, although the rhetoric is right, the rules are wrong. It regulates more than it deregulates. It delays and constraints competition rather than encouraging it. It is a landmark of micro-management. By accumulating every powerful lobby's request to tilt the playing field to their relative advantage, it inadvertently introduces a new level of government interference in virtually all forms of electronic communication. It became, in the lingo of the Beltway, a classic "Christmas tree"—a bill to which each industry group attached its own self-serving ornament.

Moreover, activists challenged the provisions for criminalization of indecent content potentially available to children on free-speech grounds within hours of the bill's being signed into law on 8 February 1996. We expect future court challenges to other elements of the act, and additional court proceedings in response to the Commission's mandates, inquiries, and findings.

The act itself is intended to "provide for an orderly transition from regulated markets to competitive and deregulated telecommunications markets consistent with the public interest, convenience, and necessity." In reality that translates into inventing a whole new class of regulations to manage the transition to deregulation. The size of the bill alone tells the real story—over 100 pages of detailed prohibitions and regulations. The term "deregulation" appears twice, the term "regulation" (or a cognate such as "regulatory"), 202 times. There are 353 specific references to "the Federal Communications Commission, including 94 cases of "The Commission shall" and 30 cases of "The Commission may." There are 80 formal proceedings that the Commission must initiate.

Yet the publicly pronounced intent of the act is laudable: To provide for a pro-competitive, deregulatory national policy framework designed to accelerate rapidly private sector deployment of advanced telecom-
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munications and information technologies and services to all Americans by opening all telecommunications markets to competition, and for other purposes (Congressional Record, 2/1/1996, p 1145).

Furthermore, the rhetorical means of the act are laudable:

• To promote competition in provision of local telephone service.
• To promote competition in provision of long-distance telephone service.
• To promote competition in provision of multichannel television service.

But the act's language establishes complex rules and timetables for setting up additional rules and procedures to guide and regulate the transition to those end states. This is, we argue, attempting to untie the knot one strand at a time. Here, in broad outline, is the act:

Title I Telecommunications Services

Attempts to set the ground rules of competitive provision of local telephone service and for permitting local telcos to provide long-distance. Puts forward guidelines requiring existing local carriers to interconnect with potential competitors and unbundle services, details to be specified by the FCC within six months (local telcos exempted).

Calls for establishment of joint state-federal board to address evolving definition of universal service and creation of special fund to subsidize remote and high-cost service areas.

Calls for the FCC to preempt any state regulations that may inhibit competition.

Sets up detailed checklist of business practices involving interconnection with competitors with which local telcos must demonstrate compliance in order to be permitted by the FCC to provide long-distance service.

Permits local telcos to manufacture equipment through arms-length subsidiaries, dropping last requirement of Modified Final Judgment of the 1982 AT&T antitrust settlement.

Permits local telcos to engage in limited electronic publishing through arms-length subsidiary, but prohibits a long list of possible electronic services such as video, voice storage and retrieval, and video games; these restrictions expire in four years.

Permits public utility companies to provide competitive telecommunications services.

Includes numerous other miscellaneous rules requiring, for example, national geographic rate averaging for long-distance services; special rates for small businesses, disabled parties, and health care and educational institutions; and prohibition of subsidy of pay phones or provision of alarm services.

Title II Broadcast Services

Authorizes the FCC to grant licenses to existing broadcasters for advanced television services (HDTV) and permits the provision of ancillary (nonbroadcast) services under rules and conditions yet to be determined by the Congress and the Commission.

Requires that for-profit nonbroadcast services incur fees equivalent to that which would have been recovered if the spectrum had been auctioned.

Requires that the spectrum currently used by broadcasters for traditional transmission be surrendered for reallocation under rules and procedures to be determined by the Commission.

Relaxes but does not abolish current media concentration rules by permitting ownership of television stations by a single entity reaching no more than 35 percent of the American viewing audience, and permitting unlimited ownership of radio station groups but limiting ownership in a single market to between five and eight stations (depending on market size). Rules on ownership of multiple television stations in a single market.

Extends broadcast license terms and relaxes renewal procedures.

Title III Cable Services

Continues authorization of cable rate regulation under new procedures for complaint review and accounting procedures and sets an expiration date for rate regulation in 1999.

Sets up a complex definition of "effective competition" in multichannel television provision and exempts cable providers from rate regulation if the definition is met. Direct broadcast satellite (DBS) multichannel television is explicitly excluded from the definition of effective competition.

Sets up a new category of multichannel television service called "open video systems" similar to previous video-dialtone regulations, which permit common-carriage-like provision with fewer regulations.

Exempts small cable operators from rate and cross-ownership regulations.

Permits limited telco cross-ownership of cable companies and permits telco provision of multichannel television with different regulations if spectrum or wireline facilities are used.

Requires that set-top box technologies be made available from vendors other than cable service providers.
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Requires that set-top box technologies be made available from vendors other than cable service providers.
Mandates FCC inquiries into closed captioning and audio television services for the visually impaired.

Title IV - Regulatory Reform
Permits the FCC to waive some provisions of this act if it determines that enforcement is not required to ensure just and reasonable charges for the protection of consumers and the provision of universal service; but the Commission may not waive the local telephone company competitive checklists prescribed under Title I.

Requires the Commission to conduct biennial reviews of the impact of the act's regulations.

Title V - Obscenity and Violence
Restricts obscene or harassing use of "telecommunications device."
Requires scrambling of sexually explicit programming on cable.
Creates criminal penalties for anyone who knowingly transmits obscene materials on an interactive computer service.
Permits computer systems operators to block information consumers find objectionable but frees them from liability resulting from possible transmission of objectionable materials.
Requires transmission of a rating code that indicates presence of explicit sexuality and violence in programming and mandates television set manufacturers of sets over 13 inches in diameter to include a V-Chip to detect codes, thus permitting parental control over children's viewing.

Title VI - Effects on Other Laws
Supersedes the 1982 AT&T Consent Decree and related decrees. Preserves relevance of antitrust legal tradition.
Removes the FCC from reviewing antitrust ramifications of telco mergers.
Restricts taxation of direct broadcast satellite services.

Title VII - Other
Forbids switching of long-distance unauthorized by customers (slamming).
Addresses regulations on pole attachments and zoning of satellite antennas.
Requires the FCC to facilitate development of advanced telecommunications services especially to educational and medical facilities and public sector institutions.

Sets up Telecommunications Development Fund to promote access for small businesses, rural, and underserved urban areas.

The act consistently changes which rules apply depending on which actor is providing service. The very titles of the act reflect the different rules proposed for telephone, broadcast, cable, computer network, satellite, and public utility providers. Broadcasters (may) get free spectrum for ancillary use (including telecommunications), but telephone companies are expected to bid at auction. The rules about obscene or indecent communications via computer network are different from broadcast, from cable, and from telecommunications services. The V-Chip provisions apply to television, but not video over the Internet.

The act requires the Commission to make numerous decisions about the existence or absence of effective competition, the fairness of prices, possible discrimination among vendors, possible cross-subsidy between different types of communications services, the technical viability of interoperability, the physical location of telecommunications switching facilities, the character of communications content, and the impact of regulation on market behavior.

Take for example the following language of the act from Title I, Section 274, which attempts to define what is and is not permissible "electronic publishing" by a Bell Operating Company. The intent presumably is to protect new competitive entrants from the economies of scale and marketing clout of the existing telcos, but the regulatory complexity approaches the absurd:

Electronic Publishing by Bell Operating Companies
(a) Limitations.—No Bell operating company or any affiliate may engage in the provision of electronic publishing that is disseminated by means of such Bell operating company's or any of its affiliates' basic telephone service, except that nothing in this section shall prohibit a separate affiliate or electronic publishing joint venture operated in accordance with this section from engaging in the provision of electronic publishing.

(b) Separated Affiliate or Electronic Publishing Joint Venture Requirements.—A separated affiliate or electronic publishing joint venture shall be operated independently from the ILEO operating company. Each separated affiliate or joint venture and the Bell operating company to which it is affiliated shall:
Mandates FCC inquiries into closed captioning and audio television services for the visually impaired.

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The act requires the Commission to make numerous decisions about the existence or absence of effective competition, fairness of prices, possible discrimination among vendors, possible cross-subsidy between different types of communications services, the technical viability of interoperability, the physical location of telecommunications switching facilities, the character of communications content, and the impact of regulation on market behavior. Take for example the following language of the act from Title I, Section 274, which attempts to define what is and is not permissible "electronic publishing" by a Bell Operating Company. The intent presumably is to protect new competitive entrants from the economies of scale and marketing clout of the existing telco, but the regulatory complexity approaches the absurd:

**Electronic Publishing by Bell Operating Companies**
(a) Limitations.—No Bell operating company or any affiliate may engage in the provision of electronic publishing that is disseminated by means of such Bell operating company's or any of its affiliates' basic telephone service, except that nothing in this section shall prohibit a separated affiliate or electronic publishing joint venture operated in accordance with this section from engaging in the provision of electronic publishing. (b) Separated Affiliate or Electronic Publishing Joint Venture Requirements.—A separated affiliate or electronic publishing joint venture shall be operated independently from the Bell operating company. Such separated affiliate or joint venture and the Bell operating company to which it is affiliated shall:
(1) maintain separate books, records, and accounts and prepare separate financial statements;
(2) not incur debt in a manner that would permit a creditor of the separated affiliate or joint venture upon default to have recourse to the assets of the Bell operating company;
(3) carry out transactions (A) in a manner consistent with such independence, (B) pursuant to written contracts or tariffs that are filed with the Commission and made publicly available, and (C) in a manner that is auditable in accordance with generally accepted auditing standards;
(4) value any assets that are transferred directly or indirectly from the Bell operating company to a separated affiliate or joint venture, and record any transactions by which such assets are transferred, in accordance with such regulations as may be prescribed by the Commission or a State commission to prevent improper cross-subsidies;
(5) between a separated affiliate and a Bell operating company—(A) have no officers, directors, and employees in common after the effective date of this section; and (B) own no property in common;
(6) not use for the marketing of any product or service of the separated affiliate or joint venture, the name, trademarks, or service marks of an existing Bell operating company except for names, trademarks, or service marks that are owned by the entity that owns or controls the Bell operating company;
(7) not permit the Bell operating company—(A) to perform hiring or training of personnel on behalf of a separated affiliate; (B) to perform the purchasing, installation, or maintenance of equipment on behalf of a separated affiliate, except for telephone service that it provides under tariff or contract subject to the provisions of this section; or (C) to perform research and development on behalf of a separated affiliate;
(8) each have performed annually a common review—(A) that is conducted by an independent entity for the purpose of determining compliance during the preceding calendar year with any provision of this section; and (B) the results of which are maintained by the separated affiliate or joint venture and the Bell operating company for a period of 5 years subject to review by any lawful authority; and
(9) within 90 days of receiving a review described in paragraph (8), file a report of any exceptions and corrective action with the Commission and allow any person to inspect and copy such report subject to reasonable safeguards to protect any proprietary information contained in such report from being used for purposes other than to enforce or pursue remedies under this section.
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(6) not use for the marketing of any product or service of the separated affiliate or joint venture, the name, trademarks, or service marks of an existing Bell operating company except for names, trademarks, or service marks that are owned by the entity that owns or controls the Bell operating company;

(7) not permit the Bell operating company—(A) to perform hiring or training of personnel on behalf of a separated affiliate; (B) to perform the purchasing, installation, or maintenance of equipment on behalf of a separated affiliate, except for telephone service that it provides under tariff or contract subject to the provisions of this section; or (C) to perform research and development on behalf of a separated affiliate;

(8) each have performed annually an independent common carrier review—(A) that is conducted by an independent entity for the purpose of determining compliance during the preceding calendar year with any provision of this section; and (B) the results of which are maintained by the separated affiliate or joint venture and the Bell operating company for a period of 5 years subject to review by any lawful authority; and

(9) within 90 days of receiving a review described in paragraph (8), file a report of any exceptions and corrective action with the Commission and allow any person to inspect and copy such report subject to reasonable safeguards to protect any proprietary information contained in such report from being used for purposes other than to enforce or pursue remedies under this section.

(c) Joint Marketing—

(1) In general.—Except as provided in paragraph (2)—(A) a Bell operating company shall not carry out any promotion, marketing, sales, or advertising for or in conjunction with a separated affiliate; and (B) a Bell operating company shall not carry out any promotion, marketing, sales, or advertising for or in conjunction with an affiliate that is related to the provision of electronic publishing.

(2) Permissible joint activities.—(A) Joint telemarketing.—A Bell operating company may provide inbound telemarketing or referral services related to the provision of electronic publishing for a separated affiliate, electronic publishing joint venture, affiliate, or unaffiliated electronic publisher, provided that if such services are provided to a separated affiliate, electronic publishing joint venture, or affiliate, such services shall be made available to all electronic publishers on request, on nondiscriminatory terms. (B) Teleming arrangements.—A Bell operating company may engage in nondiscriminatory telemarking or business arrange
tments to engage in electronic publishing with any separated affiliate or with any other electronic publisher if (i) the Bell operating company only provides facilities, services, and basic telephone service information as authorized by this section, and (ii) the Bell operating company does not own such telemarking or business arrangement. (C) Electronic publishing joint ventures.—A Bell operating company or affiliate may participate on a non-exclusive basis in electronic publishing joint ventures with entities that are not a Bell operating company, affiliate, or separated affiliate to provide electronic publishing services, if the Bell operating company or affiliate has not more than a 50 percent direct or indirect equity interest or the equivalent thereof or the right to more than 50 percent of the gross revenues under a revenue sharing or royalty agreement in any electronic publishing joint venture. Officers and employees of a Bell operating company or affiliate participating in an electronic publishing joint venture may not have more than 50 percent of the voting control over the electronic publishing joint venture. In the case of joint ventures with small, local electronic publishers, the Commission for good cause shown may authorize the Bell operating company or affiliate to have a larger equity interest, revenue share, or voting control but not to exceed 80 percent. A Bell operating company participating in an electronic publishing joint venture may provide promotion, marketing, sales, or advertising personnel and services to such joint venture. (D) Bell Operating Company Requirement.—A Bell operating company under common ownership or control with a separated affiliate or electronic publishing joint venture shall provide network access and interconnections for basic telephone service to electronic publishers at just and reasonable rates that
are tariffed (so long as rates for such services are subject to regulation) and that are not higher on a per-unit basis than those charged for such services to any other electronic publisher or any separated affiliate engaged in electronic publishing.

Or review the following language, which attempts to make it very clear how rural telecommunications service providers are to be treated with special care:

(1) Exemption for certain rural telephone companies.—(A) Exemption.—
Subsection (c) of this section shall not apply to a rural telephone company until (i) such company has received a bona fide request for interconnection, services, or network elements, and (ii) the State commission determines (under subparagraph (B) that such request is not unduly economically burdensome, is technically feasible, and is consistent with section 254 (other than subsections (b)(7) and (c)(1)(D) thereof).—(B) State termination of exemption and implementation schedule.—The party making a bona fide request of a rural telephone company for interconnection, services, or network elements shall submit a notice of its request to the State commission. The State commission shall conduct an inquiry for the purpose of determining whether to terminate the exemption under subparagraph (A). Within 120 days after the State commission receives notice of the request, the State commission shall terminate the exemption if the request is not unduly economically burdensome, is technically feasible, and is consistent with section 254 (other than subsections (b)(7) and (c)(1)(D) thereof). Upon termination of the exemption, the State commission shall establish an implementation schedule for compliance with the request that is consistent in time and manner with Commission regulations.

Time and again, the act substitutes political muscle for public interest in determining policy. Take, for example, the definition of effective competition for deregulation of cable television. Multichannel television competition from a telephone company counts as effective competition, but the same service provided by a satellite service does not. Why? Well if one counted competition from satellite broadcasting in the United States in 1996, virtually all markets would qualify as effectively competitive because of the existence of DirectTV and PrimeStar multichannel direct broadcast satellite service offerings.

Similarly, the act introduces the idea of competition in local telecommunications with great grandeur, but local competition was already under way in a dozen states under a variety of local deregulatory experiments.

Will the public interest in universal service be adequately protected in the act? A complicated fund for providing competitive service for regions not likely to get competition (and hence, lower rates) is embodied. But just who benefits from this—and what it does for those left out of the information revolution due to lack of money, education, or interest—is quite unclear. Assumptions that competition will lower costs without pushing margins to the razor’s edge were clearly behind the grand view of the bills of the past several years, but a more compelling problem has arisen in the meantime: how does either the industry or the government finance future telecom infrastructure if carriage approaches zero cost as capacity approaches infinity, and if markets for carrying bits contract because of new technologies rather than expand. This is not conventional wisdom for conventional economics; the act may be much too late.

The questions at the moment are: (1) whether the deals struck will remain acceptable to a confused Congress and a perplexed administration during and after a particularly divisive election year; and (2) whether the large long-distance firms (AT&T, MCI, Sprint) have sufficient market presence to withstand the assault from equally powerful new competitors without the albatross of obsolete plant as they enter the competitors’ local market, which has a similar set of technical burdens. It is likely that a new, though perhaps not as comprehensive, bill may be crafted in the near future. If new deals cannot be struck among these companies, different arrangements will be proposed by a future administration and a different Congress. As local rates zoom where traffic remains stagnant, all sorts of unexpected anomalies may start driving new entrants and the general public to distraction. The sweet smell of success may turn sour quite rapidly unless some miracle creating new markets, new jobs, and new money appears rather quickly.

The Clinton administration, in spite of its unhappiness with provisions on cable television rate deregulation and purportedly with matters relating to universal service and attacks on freedom of speech, needed a bill to demonstrate its continued leadership in national and Global Information Infrastructure development. It felt it had to confirm its ability to work
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The principal failure of the act is the clear lack of understanding shown regarding the real progress being made toward development of the National Information Infrastructure through the incredibly rapid expansion of internetworked small and distributed computer processing—the Internet. The Internet's main feature—a "bug" to those who like things orderly and predictable—is that the net is uncontrollable, even chaotic. Its novel and radical applications, evolving open protocols, growth of users and traffic, and most important, its unpredictable charge, has become a global driving force for information infrastructure. It is both scary (as the Chinese government has demonstrated by its regressive laws) and exhilarating (as the stock market has indicated by multiples in the stratosphere for certain companies with dubious products and negative income flows).

For example, on the Internet:

- traffic can shift suddenly;
- services can change suddenly;
- new technology and potential de facto standards can be introduced by anyone, as long as they work;
- the only effective "governing body" is the all-volunteer group of experts called the Internet Engineering Task Force, which deals with technical protocol design and maintenance;

- a residual coordinating power remains with the U.S. government through R&D programs of the Department of Defense Advanced Research Projects Agency and the National Science Foundation—but both of these agencies are by their nature averse to regulatory policy-making. Due to pressure from the formerly dominant computer and telecom firms, the Federal government is easing out of one area after another related to the "governance" of the Internet. At the same time, the Federal Communications Commission and the Federal Trade Commission are increasingly questioning how their traditional regulatory activities are being affected by the growth of the Internet. Instead of direction being taken up by the old-line conventional firms, the past few years have shown even more chaos and radically innovative ideas coming from small firms (that become big firms overnight) such as Netscape, Newbridge, Sun, Cisco, Intel, Cascade, and Microsoft. A decade ago, who would have predicted that such firms would dominate with power and ideas? What have AT&T, IBM, and DEC contributed that shifted the path of information infrastructure in comparison with what the new giants on the block have done? From one cynical point of view, it can be said that the old firms contributed the laid-off personnel that helped direct the new leading companies.

The lack of understanding in Congress and among the special-interest lobbying groups may be the biggest surprise of the early years of the next millennium. The delay and equivocation that will certainly emerge from lawsuits arising out of the act's contradictory provisions cannot be avoided in the U.S. political process. While older vested interests (and the jobs they encompass) may realize they bought a devil's bargain, telecommunications lawyers and consultants are not threatened by the legislation in any way and can look forward to a prosperous and fruitful future under any scenario.

The Law of Unintended Consequences

Another likely effect of the act is that it will have significant recursive effects on technology, market development, and policy practices: the law of unintended consequences. In this, the recursive nature of digital computers themselves—that a stored-program device, as Alan Turing understood from the very beginning some sixty years ago, can define its own instructions, its own cyberspace, so to speak—are a natural outgrowth of a chaotic system under no one's control.
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It is unlikely that the technical, economic, and policy distortions introduced by the Telecommunications Act of 1996 will inhibit the rapid development of the National and Global Information Infrastructures, but the realization of universal service and its social benefits for education and health care, to name just two areas, are unlikely to be either equitable or substantive without some major modifications in the near future. It certainly was not the intention of the bill's drafters to spread the new wealth, but the public has yet to be heard. As with other concerted public movements in the past—ranging from the original pressures to regulate and rein in the railroads and telecom firms in the past century, to anti-monopoly actions in this century, to the current powerful and increasingly popular grassroots movement for environmental protection and change—telecommunications is sure to be affected by the reaction of its customers to the new provisions. Unlike some other industries that labor and profit in quiet sectors, communications deals with everyone, all the time, and in insidious ways. The actors cannot hide.

But aside from the potential unintended consequences of the act, there are the obvious embodied flaws: Parts of the act include unconstitutional, and in some unenforceable, abridgments of the freedom of speech, the press, religion, and the right to petition the government for a redress of grievances. The history of the laws protecting speech (and it has been noted that the First Amendment is but a local ordinance in cyberspace) indicates that courts in all democratic countries take a narrow view of government interference in such rights because through bitter experience, democratic citizens do not trust their governments. Such lack of trust extends to the denizens of government bureaucracies themselves, who know how greatly power can corrupt. Arguments about speech will not simply go away because of ill-conceived legislation. Indeed, since the act was passed the level of "obscene" speech on the Net has probably increased as "netizens" feel compelled to challenge the act's restrictions.

One unintended consequence of the act is that the legal separation and traditional treatment of the printed press, broadcasting, and telecommunications may have collapsed in a new framework that pretends to provide a consistent treatment for all media. This was the key point Ihriel de Sola Pool made in his landmark study, *Technologies of Freedom* (Pool 1983). As we noted, how does one categorize "multicasting" under the new law? Another unintended result: if the separate treatment of broadcasting and telecommunications no longer stands up to legal scrutiny, and if government intrusion into private communications between individuals and groups is to be sanctioned, then the effects of the act may be either incredibly repressive, or if thrown out by the courts, a useless exercise.

In the Internet community, it is said that "the Internet treats censorship as a broken connection and works around it." It is important to understand that this is more than an allusion—the Internet Protocol (IP) does not exist exactly this, and to program servers extending the route with Web software is simple—even a grade-school student can learn how. Perhaps another unintended consequence of the act is to raise the status of technical prodigies to political heroes. Who said government doesn't know how to insculp educational goals and create new jobs?

The futile attempt in the Congress to pander to an ill-informed public about the real, but far from pervasive or intrusive, dangers of on-line pornography is one pertinent example of how far congressional and press attention was removed from the critical question of whether the cross-sectional deals struck in the act will really serve to "provide for an orderly transition from regulated markets to competitive and deregulated telecommunications markets consistent with the public interest, convenience, and necessity."

More appropriate than the provisions of the act for governing the requirements of an information-intensive society would be a new policy framework for an Open Communications Infrastructure. This new framework would make no distinction between wired and wireless networks or between content and conduit. Only such a unified policy framework is capable of supporting social and economic needs as well as sustaining technical development in the years to come. This act falls far short of this goal.

**Conclusion**

It is a perilous venture to write about communications policy when politicians, lobbyists, and the daily papers assure us that the key issues have been resolved by the new act. We think not. For, as we have argued,
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neither the myopic advocates of incremental changes to the status quo nor the breathless futurists and cyberspace libertarians have adequate understanding of Open Communications Infrastructure. One side would have us inch forward (or backward) on the information highway, the other would have us wander, lost in cyberspace without a map or any shared understanding of the rules of the road. In the following chapters we review the basis in technology, economics, and policy for our position.

2

The Nature of Networks

Perhaps the information superhighway rubric has become so popular because it resonates with people’s idealized sense of what a network ought to be: Access is easy, and coverage and speed are maximized. Highways, supplanting railroads, canals, and post roads, became the commons of the industrial age. Although built and often maintained by private contractors, highways, like public communications systems, are essentially public entities, built with public resources for the public good. Furthermore, the hub-and-spoke architecture of transportation systems was the model for telegraphy, telephony, and broadcasting. Although historically apt, the highway metaphor could prove to be a misleading model for public communications policy, because modern digital communications systems do not work like physical highways. Their architectures, load dynamics, and economic properties are unique. We will explore the nature of networks—when the highway and infrastructure metaphors are useful for understanding the communications revolution, and when they are not.

Roads and Railways
The railroads, because they required different physical links than those of any previous infrastructure, were the first of several industrial innovations to exploit and redefine networks and networking. As we discuss in chapter 3, railways evolved from little more than wooden guide rails laid in the public highway, and as Schivelbusch described, “as the notion of transportation was freed from its organic fetters by steam power, its relationship to the space it covered changed quite radically” (Schivelbusch 1986).