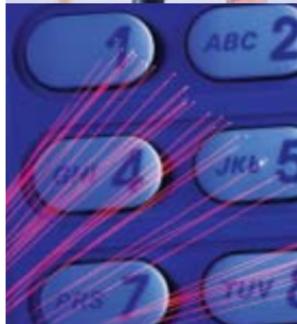
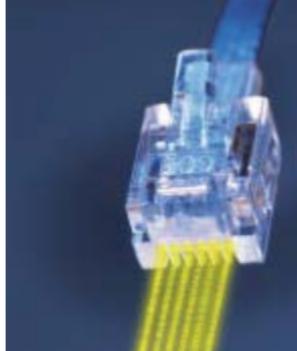


Communications Policy Guide

Release 2.0

*Thomas Jefferson Institute
for Public Policy*



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TABLE OF CONTENTS

The Technological Landscape	3
The Constitutional Landscape	5
Guiding Principles.....	7
A Closer Look at Key Issues: Cutting Across Technologies.....	11
Franchising and Licensing	11
Regulatory Reform & Accountability	13
Universal Service	14
Encouraging the Spread of Broadband.....	20
Growth Opportunities	22
Municipal Broadband Networks.....	25
Voice over IP (VoIP).....	27
Net Neutrality	30
Price Regulation Among Carriers: Access Charges	33
A Closer Look At Specific Sectors: Familiar Services & Problems	35
Cable (Video).....	35
Traditional Local Telephone Competition (Voice)	37
Satellite.....	47
Wireless	49
Glossary of Terms.....	59



INTRODUCTION

The communications industry continues to undergo dramatic change. The most recent federal law affecting the industry as a whole, the Telecommunications Act of 1996, is now completely out of date. It failed to anticipate the widespread adoption of wireless communications and new applications like Instant Messaging and Voice over Internet Protocol (VoIP), let alone the broad substitution for traditional wire-line phone service. Never has there been a clearer example of the inability of law to keep pace with technology.

Technology continues to outpace the outdated US regulatory structure—which still has trouble recognizing that the commonly held understanding of such technologies as “cable” or “telephone” are no longer relevant.

Traditional video providers have offered voice service for some time, and traditional telecom companies are rolling out video services. Communications firms plan to bring new products and services to consumers and businesses, while investing in critical U.S. infrastructure and fostering innovation.

Competition in a free market should be recognized as the hallmark of a consumer-focused marketplace where providers compete on the basis of innovation, quality, price and customer service. But attempts by government to regulate and tax the communications industry hinder these advances. Governments must move away from central government control and toward competitive markets. Competition among communications companies using a

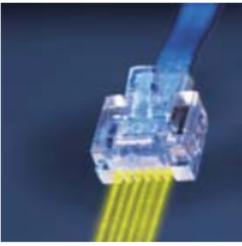
variety of communications technologies is here now. But regulation dating from the age of monopoly still stifles the investment needed to stimulate economic growth and job creation.

Without doubt, the communications technologies that best deliver the products and services embraced by consumers are those operating in unregulated or lightly regulated environments proving that deregulation spurs even more innovation and competition, and brings consumer satisfaction.

This Guide to Communications Policy explains in plain language the issues and opportunities that policy makers face in considering the future of the U.S. communications industry. It supplies legislators otherwise at the mercy of regulatory jargon with the tools to make intelligent, principled decisions. The Guide reflects a nonpartisan but distinctly free-market approach that, if followed, will lead to investment, job creation, and new products and services for consumers.

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THE NEW PARADIGM

THE TECHNOLOGICAL LANDSCAPE

For over 100 years “telecommunications” referred to two-way voice-grade analog wire-line service. But today we must adapt to reality—new applications and technologies make prior stovepipe definitions and regulatory approaches irrelevant and anti-consumer.

Convergence dominates. Communications is not just voice communication. As analog technology gave way to digital, voice service has merged with all other forms of data transmission. *Today communications is the transmission and distribution of multiple forms of data (voice, text, video and more) through a variety of means.* Most providers now carry multiple data formats over all three technologies. “Telephone” companies are offering digital video, cable companies are offering voice communications, satellite companies are offering Internet access, while cellular companies also offer all three. Indeed, today almost everyone is in the “bit business.”

Convergence in communications brings extensive competition between new and old firms using very different technologies—transmission technologies may differ but the “content” sent across them is indistinguishable.

- Wireless competes with wire-line; 13 percent use wireless alone with no traditional phone service, 25 percent consider wireless their main voice communication device.

- Mobile phones are computers and offer text messaging, games, Internet access, and even video, just as a laptop or personal computer do.
- Computers compete with phones, as broadband growth expands VoIP use.
- Cable companies' cable modem service competes with phone companies DSL service in broadband markets; with most subscribers using cable—but DSL is growing faster, and wireless broadband taking off.
- Cable telephony through VoIP is growing rapidly.
- Traditional telecom companies are offering video services comparable to cable.
- Email and Instant Messaging competes with telephone service and postal mail.

Consumers use various technologies and applications for communications, and do not distinguish among them except to choose the most convenient service and best value. Federal, state and local governments must understand this fact when making policy or providing oversight. Understanding this new paradigm is the key to long-term industry and technological growth.



THE CONSTITUTIONAL LANDSCAPE

The classic argument for federalism is that we all benefit from competition between the 50 states, which serve as “laboratories” for public policy. But when it comes to electronic communications, federal law often preempts state law, and many support still broader federal preemption. So is the right answer for communications state law or federal law? The best general answer at present is, neither. Deregulation should proceed quickly at all levels. But federal regulators are often best placed to lead. The Constitution recognizes a strong federal role in interstate commerce, and today’s digital communications industry is interstate in nature.

Although federal regulators originated much over-regulation in communications, they are also best placed to affect a cure. A strong federal role in telecommunications will continue:

- All communications are now essentially interstate; physical networks, virtual communities, and the commercial marketplace for communications is national and international.
- Especially in traditional wireline telephony, regulation remains heavy; if, in addition, each state crafts its own rules, markets will be paralyzed by complexity, delays, and uncertainty. Data transmission and distribution does not recognize governmental borders.

- To build communications markets without impeding interstate commerce, states should keep laws minimal and reform public utility commissions to reduce their tendency to introduce uncertainty into communications rules.

Markets can tolerate 50 regimes of state contract or property law; these provide stable and simple ground rules, leaving us to make our own business decisions. By contrast, 50 different complex communications regimes create arbitrage and waste and will stifle or distort investment decisions that ought to be geographically neutral. In most cases, the correct question is not who should regulate but rather, how quickly can deregulation take place.





GUIDING PRINCIPLES

These rules of thumb offer guidelines that will work in the face of rapid change, complex technology, and the limitations of government. While one can never expect perfection, these principles will keep entrepreneurs free to respond to consumers wants and needs as part of an ongoing market process.

DON'T REGULATE WHAT CAN'T BE REGULATED

Policymakers are sometimes tempted to enact unenforceable rules as political gestures. For example, laws aimed at the Internet can be evaded by relocating a server offshore. One U.S. Senator threatened to “pull the plug on the Internet” if his proposed legislation couldn’t be enforced. Such empty threats result in a cynical attitude to all law. Policymakers should accept technological reality and not “tilt at windmills” for the sake of political gain.

DON'T REGULATE WHAT DOESN'T REQUIRE REGULATION

Innovation drives increased productivity, faster growth, and higher personal incomes. If something doesn't absolutely need to be regulated, it shouldn't be regulated. Regulations designed in an age of monopoly hinder today's rapidly changing, competitive market. Regulations designed for old technologies should not be applied to new and emerging technologies.

LEGISLATION IS BETTER THAN REGULATION

The will of citizens is best reflected in the actions of their elected legislators, not in the decrees of a few regulators. Legislation creates a more predictable environment for business planning and is generally more responsive than discretionary regulatory oversight. Whenever possible, elected legislators should develop and establish telecommunications policy, leaving as little as possible within the purview of regulators.

THE CONSUMER IS THE BOSS, AND THEY KNOW WHAT THEY WANT

The legal ground rules for the communications industry should respect consumer choice. If consumers want a bundle of services from a single provider, they should be allowed to have it. Business do not exist to harm consumers, but rather to please as many consumers as possible. “Consumer groups” often work from the assumption that businesses seek to harm their customers, leading them to assume the worst and support surreally over-regulatory policies.

Existing “consumer protection” rules often protect companies from their competitors, rather than protecting consumers. True consumer protection should be directed at real, concrete consumer harm like fraud, not some vague or imagined potential for harm. Regulations designed to anticipate and prevent problems are almost always doomed to failure.



NEUTRALITY SHOULD BE THE GOAL

Tax and regulatory policy should be technologically neutral. Why should one method for accessing the Internet be highly taxed and regulated, while others are not? Why are communications companies more highly taxed and regulated than other industries? One would think they should be taxed at lesser rates given our reliance on communications to improve so many facets of life.

Particularly in sales to the consumer, a policymaker's goal should be neutrality, so that technologies and companies succeed or fail in the marketplace, not through the success or failure of their lobbying efforts. But neutrality should not be achieved by applying pervasive regulation to new technologies. In the wholesale market, if any regulation is necessary, only a very light touch should be used. Overall, incumbent technologies should be deregulated—regulate down, not up.

ELIMINATE ARTIFICIAL DISTINCTIONS

Convergence makes old legal and regulatory distinctions irrelevant. In the digital world, the distinction between local and long-distance phone service has no meaning. Also meaningless are different regulatory regimes for cable, telephone, or satellite companies as they are all delivery of the same product. Companies that once carried one-way video now compete with companies that once carried only two-way voice traffic. This is convergence.

Regulations based on invalid distinctions will fail in their purpose and do real economic harm.

SUBSTITUTION IS COMPETITION

If consumers substitute one technology for another, this is, in reality, competition, regardless of any so called antitrust policies. Wireless, cable telephony, VoIP, email and even instant messaging compete with traditional wire-line phone service; satellite video and now IP-switched video from telecom companies compete with cable television. Consumers can choose between these media and substitute one for another. This is “inter-modal” competition. Certainly for retail sales there should be no regulatory distinctions between technologies and services that compete with each other. Again, for wholesale sales if any regulation is necessary it should be, at most, limited and a light touch.

DON'T USE ECONOMIC REGULATION FOR SOCIAL GOALS

For every new service, someone always claims that regulation is needed to supply protected classes in society. These include low-income populations who cannot afford the service, and the elderly. But complex price and revenue regulation for this purpose makes no sense. State legislatures and Congress can authorize spending to provide direct subsidies to those in need. We supply food stamps to the poor rather than regulating the grocery business. The debate about the need for such welfare mechanisms should take place in the legislature, not through the regulatory system. In general, a much better approach would be to clearly identify the objectives and then allow competitive industries to determine the best technology and business case to meet the goals.





A CLOSER LOOK AT KEY ISSUES:

CUTTING ACROSS TECHNOLOGIES

This section looks at issues that affect all or several types of communications firms, regardless of their history or the technology they use. We call these “multi-modal” or “cross-modal” issues.

Franchising and Licensing

Government franchising and licensing began with federal government grants of lucrative rights of way to the railroads in the 19th century, creating incentives for the completion of the transcontinental railroad. State, county and municipal governments got into the act soon afterwards by requiring power, gas and landline telephone companies to sign franchise agreements in exchange for access to rights of way. Further, the function of these grants was to bring a flow of lucrative licensing and franchise fees into municipal coffers in exchange for giving service providers monopoly status. Cities could force private sector service providers to levy a transaction tax on their customers and special treatment for local politicians—Robin Hood economics in reverse.

Today, providers such as satellite and wireless do not use local rights of way. There are no cables to lay, no poles to erect (although they may have towers to build) and no wires to string. No wireless provider should pay franchise fees just for transmitting across a right of way, especially as they have already paid their right of way by buying

access to spectrum and rental fees for tower sites. And providers that do use rights of way should not be asked to pay new franchise or license fees just for using existing cable for a different type of service. The new use puts no extra burden on the right of way. Yet some local governments insist on requiring a new license or franchise for new services to keep the flow of funds coming into commingled general tax funds, effectively taxing communications users.

Providers that use the same facilities for multiple services do not place any additional burdens on the use of the right of way and should not be double assessed as if they did. Right of way fees should be at a level reflective of costs to manage the right of way and should not be levied like a business license tax of general applicability.

Fortunately, many states are reexamining the need for franchise and licensing requirements which had most often served as an inhibition on growth and expansion of services. With cable and many other communications services nearly ubiquitous nationwide, the need for firms to reach franchise agreements with literally scores of municipalities and other political subdivisions stands in the way of actually providing service. As an alternative, a statewide or national franchising system that provides for some fees to be collected and shared with local subdivisions makes much more sense, and these systems should explicitly provide that all communications carriers be treated similarly. Public interest broadcast channels and public safety capacities could be better coordinated. Revenue sharing is already widely used to limit jurisdictional taxing authority while ensuring that necessary revenues are collected and distributed.



Regulatory Reform & Accountability

State public utility commissions are intended to be independent, but this can translate into a lack of accountability that makes PUC rules very expensive for consumers and businesses, while denying access to the best available technology. This is a thorny problem, but as competition in communications emerges, public utility commissions will no longer be needed to regulate retail services. While markets do not discipline prices and service perfectly, they are far better than regulation. Increasingly, state legislators are recognizing this and rolling back regulatory authority over rate-setting and other issues.

Appointed public utility commissioners serve as unelected lawmakers, judges, and enforcers, violating the principle of separation of powers; furthermore, their discretion is often broader than any of these. This creates enormous problems of uncertainty, made worse when PUC staff are free to pursue their own political agendas. In states that elect their public utility commissions, policy proposals tend to be hijacked by populist intervention sold as a way to keep prices down in the short run with little attention to real costs, quality, choice, or economic growth.

Where necessary, the ground rules for communications goods and services should be set by legislators, a more accountable process with a clearer and more stable result. The legislative branch of government is the policy-making branch. Only when absolutely required should regulatory authority be granted, and never with broad discretion. Legislators should be aware of alternatives to regulation, such as referring interconnection disputes between carriers to private arbitration.

Regulation is only justifiable when public health and safety requires it, or, rarely, to strengthen competition when entry into the market is impaired by some factor other than normal costs, and perhaps in some other rare circumstances. In communications these circumstances rarely exist, with perhaps an exception for places where real bottlenecks exist such as in transit, and legislators at both the state and federal level are recognizing this reality.

Universal Service

The idea of universal service was promulgated by the old Bell System in the early days of two-way voice-grade telephone service to enlarge and protect their monopoly. Their slogan was “one system, one policy, universal service.” Today universal service is a grotesque anachronism.

Video, voice, and other data are carried over a multiplicity of competing technologies, whether around the corner or around the world. The baroque universal service rules adopted by federal and state regulators in the age of monopoly inhibit innovation and deployment to the benefit of absolutely no one. The system’s baffling collection and distribution mechanisms amount to an enormous regulatory tax-and-spend mechanism that keeps the most efficient technologies out of the communities that need them most. For example, rural areas can be served at low cost by wireless technology; supplying communications carriers in these areas with a subsidy denies wireless carriers the opportunity to provide that service, benefiting the traditional wireline carrier at the expense of consumer choice.



The typical speech on universal service pays tribute to universal service as a guarantor of affordable access to communications service. Access to communications service is indeed a wonderful thing. But no one pursuing this goal today would create anything like the current federal and state universal service policies. The current system is a shell game, expensive, unfair, and wasteful. Legislators must show leadership on this issue to protect consumers. It is a tax and spend issue.

The Telecommunications Act of 1996 established the \$7 billion federal Universal Service Fund (USF). The states determine eligibility to receive federal USF support. In addition, many states have their own universal service programs for low-income residents, and half have programs for local phone companies that provide service in “high-cost” (usually rural) areas. Both the federal and most state USF funds are in need of review and overhaul—or elimination.

The largest “explicit” federal USF programs are \$4.5 billion for carriers in high-cost areas, and \$2.25 billion to wire schools and libraries to the Internet. Programs targeted to low-income telephone subscribers account for about \$700 million. The “non-rural” fund, which goes only to large carriers, is about \$290 million. Federal universal service is funded by a line item on customers’ bills for interstate phone service. Many (not all) state programs are still funded by hidden (“implicit”) charges on intrastate long distance and business revenue. Universal service programs grew up in an age of monopoly. In a competitive era, they are unsustainable.

Total federal universal service spending has increased from \$1.8 billion in 1997 to 6.5 billion in 2005. Much of the increase is due to regulators' efforts to transfer subsidies from "hidden" carrier charges to "explicit" fees and funds. But this is little comfort, if it brings no added accountability or limits. For example, the "Access Restructure Mechanism" is bringing about a \$1.5 billion increase in the USF. The two biggest ILECs now own the two biggest long distance carriers, so the carrier charges go from one pocket into the other; transforming this zero sum game into an institutionalized tax simply adds inefficiencies by involving other carriers and consumers.

Making the charges explicit highlights the sheer massive size of the subsidy, most of which goes to companies whose legacy analog technology is the least efficient available. And this amount is increasing, even though technology and competition bring costs down. From 2002 to 2003 incumbent phone companies accounted for 87% of the growth in the high-cost fund. At the same time most incumbents became entitled to pricing flexibility and alternative regulation, meaning that they can adjust their business plans without "make-whole" subsidies and an entitlement to revenue neutrality. The problem is most visible to consumers irate about the line items on their bills, but many costs to consumers are concealed.



How the System is Rigged to Grow Out of Control

It would be unfair for some companies to pay in and others not. So everyone (under the 1996 Telecom Act, telecommunications carriers providing interstate service) is pressured to pay in. But, then, everyone wants to take out of the pool; anyone who doesn't stake a claim loses out to more aggressive competitors. The subsidies are a narcotic; the beneficiaries are soon addicted, and soon no longer try to do without.

For example, wireless companies urged successfully that they should qualify for the subsidies—they pay much more into the fund than they take out. But then ratepayers end up subsidizing multiple companies to compete against one another. And of course no competitor in the market should get less support than the (often inefficient) incumbent—that would be unfair. In rural areas, where competition is most needed to bring down costs, section 251 of the Act handles the tension between competition and subsidies by barring competition. Funds going to rural telephone companies grew by \$190 million between 2002 and 2003. This leads to reform proposals such as that contemplated by FCC Chairman Kevin Martin, reverse auctions that would direct a subsidy to only one carrier in a market. But this might be anticompetitive.

There is one way out. End the addiction by going cold turkey. Technology has outgrown the whole system of universal service. Understanding this is vital to competition. Holding prices down for wireline service—or any mode of service for that matter—discourages new entrants (studies show that consumers become more willing to substitute wireless for wireline when the price difference is only \$6-\$7 a month). Subsidizing high costs

reduces incentives to develop and deploy low-cost technologies. It is unfair to expect some (not necessarily well off themselves) to pay more so that others (perhaps very well off indeed) may pay less. One important point: the government cannot saddle a company with “provider of last resort” responsibilities but at the same time remove all government support for those provisions.

Out of the Maze

The system is at a crossroads. “Fairness” and “neutrality” are presently sought by endlessly expanding the universal service revenue base (to VoIP, to broadband, and beyond) and the recipients of subsidies (perhaps to broadband, to customer equipment, to satellite dishes, and beyond). That is the wrong path to follow. True fairness and neutrality will never come from corporate welfare, whether it goes to one or many.

The way out is to dismantle the subsidies entirely. Some carriers depend completely on subsidies. A schedule must be established to wean them off them. Special universal service charges should be dismantled; any residual universal service program should be replaced by market and tax incentives designed to encourage investment and business expansion.

Ultimately, radical reform of the USF regime is necessary. However, because the USF system has powerful political constituencies, these suggested incremental reforms may be as much as can be expected, and would represent a distinct improvement. But some measures include:



Maintain Accountability. Make sure consumers can see universal service charges on their bills. Some states have impeded this process by making it harder for carriers to offer “line items” on the bills.

Legislative Caps. The political process is more effective than regulators in limiting costs. Colorado’s fund grew from \$35 million to over \$60 million within a few years, enraging consumers. This ended when Colorado legislators capped the fund at \$60 million. Some federal legislative proposals now contemplate caps.

Make carriers compete for support. Auction the right to be the eligible carrier in a given region to the lowest bidder. Or, make the subsidies “portable,” so that when a carrier loses a customer, it loses part of the subsidy.

Target support to needy areas. In Washington state, all the carriers dedicate their support to high-cost areas within the state, while low-cost areas receive no support. This has reduced growth of the fund.

Economic Development Incentives. Legislatures often offer tax incentives in the form of exemptions, deductions and credits or reduced assessment ratios to encourage capital formation and investment in economic development. If we wish to encourage technological innovation and deployment in rural America, then legislatures have the authority to do so without a regulatory mechanism.

Give support to means-tested customers, not companies. While unpopular with small phone companies, this approach is fairest for consumers now paying to subsidize service to other consumers no worse off than they are.

Encouraging the Spread of Broadband

Broadband means enough bandwidth to carry multiple voice, video or data channels simultaneously. Channels are separated by “guard bands” (empty spaces) to prevent interference. The technical definition of “broadband” is a moving target; “true” broadband is now said to transmit at least 1.5 Mbps (existing networks more commonly offer about 500 Kbps). Sometimes, “broadband” refers to any high-speed, always-on Internet connection like DSL and cable. Wireless broadband services like WiMax are being rolled out, promising to bring low-cost broadband to remote areas.

The FCC has sought to classify cable broadband service as an “information service” instead of a “telecommunications service” and thereby keep broadband lightly regulated. This decision was upheld by the Supreme Court in 2005. The FCC also has classified telecom-provided DSL broadband as an information service. Certainly, all forms of broadband data access should be deregulated on an equal basis.

Wider broadband deployment, especially in rural areas, will be an important driver of economic growth and expanded consumer benefits. The FCC has recognized that broadband regulation would impede the investments needed to build out broadband networks. Imposing “open access” rules requiring cable broadband networks to carry



their competitors' signals reduces the incentives of competitors to build their own networks, and deprives cable investors of the promise of good returns on their investment. The same is true of access or unbundling requirements on DSL.

The threat that such rules would be imposed on broadband is one reason that deployment in the United States now lags behind that of some other countries. The comparatively low population density of areas of the U.S. is another. 2003 census data shows that 4.7 percent of urban Internet households believed broadband was not available, 22.1 percent of rural Internet households did. Local governments can best encourage broadband deployment by making rights of way available and keeping taxes and regulation low. All governments can best encourage broadband deployment by not trying to force it through regulation.

Alternatively, America's power companies own significant rights of way along their power grids. If their power lines could be used for broadband, these companies would offer powerful competition against DSL and cable modem services. Power companies might bring broadband to areas not served by cable or DSL. Transmitting signals over power lines is problematic, but advances in chip technology have made it possible, and it is now being offered in cities in Pennsylvania, Ohio, and Virginia.

But power companies and traditional broadband face growing competition from wireless broadband. Power companies are still regulated by state commissions, some still using rate-of-return regulation. Power companies might be able to make broadband a profit center, but if regulation deprives them of a good return, they will not make the investment.

Growth Opportunities

New technology is never simultaneously deployed to everyone at once. By now we are all familiar with the term “digital divide”—that new communications technologies will reach low-income or other disadvantaged populations more slowly than others. This “glass is half empty” theory is not a problem in practice. The technology glass is half full—and filling fast. To entrepreneurs, any unserved population is an opportunity, an untapped market.

Technology Is Spreading Faster

This chart shows a remarkable fact about the spread of technology throughout the American population. Internet technology is spreading to the general population far faster than did automobiles, telephones, radios, electricity, television, VCRs, or microwave ovens.

SPREAD OF PRODUCTS TO A QUARTER OF THE POPULATION

<u>Product</u>	<u>Year Invented</u>	<u>Years to Spread</u>
Electricity	1873	46
Telephone	1876	35
Automobile	1886	55
Airplane	1903	64
Radio	1906	22
Television	1926	26
VCR	1952	34
Microwave Oven	1963	30
PC	1975	16
Cellular Phone	1983	13
Internet	1991	7

(Chart reprinted with permission of the Federal Reserve Bank of Dallas, originally appearing in W. Michael Cox and Richard Alm, Federal Reserve Bank of Dallas Annual Report, *The Economy at Light Speed: Technology and Growth in the Information Age and Beyond*, 1996, p. 14).



The trend is continuing with broadband, which is spreading through the population faster than the Internet, the VCR, or the personal computer. Newfangled gizmos are becoming affordable at a greater pace because inventions like microprocessors are bringing costs down. This innovation has been fastest in the fiercely competitive markets typical of the computer industry, markets that aren't regulated or taxed to death.

Remaining Problem Areas

Policymakers should beware “gloom and doom” scenarios involving the spread of technology to the disadvantaged. The latest NTIA (National Telecommunications and Information Administration) report, based on 2003 data, shows that although there is a gap between white, black, and Hispanic households, use is growing in all three groups at a healthy pace. Education levels are more closely correlated with Internet usage than race.

As markets become more free, even the lowest-income groups end up as a target market. For example, prepaid long-distance telephone service are targeted at low-income immigrants, who often need to call overseas and may not have ordinary long-distance phone service.

The desire to bring technology to schools has become a common justification for higher communications taxes. Voluntary private efforts, however, are a better means to this end; companies spending their own money are less likely to fall prey to the fraud and scandals that plague the federal e-rate program.

Sometimes development is slower than we would like, especially in rural areas. The costs of wiring areas of low population density are substantial. But satellite or terrestrial wireless technology drastically reduces these costs. Subsidies to rural telephone companies such as access charges should be ended. Maintaining those subsidies removes any incentive to innovation, and is unfair to other companies who would otherwise seek to enter rural markets. Low taxes and deregulation are the best way to speed entry into rural areas.

Legislatures often provide tax incentives for growth in the form of exemptions, deductions, credits, or reduced assessment ratios to encourage capital formation and investment in rural areas. Legislators have the authority to use such policies to support technological innovation and deployment in rural America. This would support “universal service” without distortive regulations.



Municipal Broadband Networks

Municipal broadband networks, including the ownership of Wi-Fi or WiMax networks by city or county government, raise several concerns. Local government's entry into the market will discourage more efficient private entrants like wireless broadband. These municipalities are exposing their taxpayers to the risks of investing in technologies doomed for extinction.

Why Government Provision Inhibits Private Investment

Government ownership of facilities that produce goods and services will make the private sector reluctant to enter those markets. As inefficient as government-run systems are, government has a virtually bottomless source of capital in a captive taxpayer base. They do not compete with the private sector for capital. They issue bonds with preferential interest rates. They need not use service revenues to repay the debt, as taxpayers and the full faith and credit of a governmental entity are backing them up. Governments can cede themselves preferential access to municipal rights of way, and price their product below cost. Some governmental leaders boldly suggest that every citizen should have free Wi-Fi or WiMax. But of course the provision of service is not free, and costs must be met from by tax revenues. This is in essence predatory pricing.

Government entry is unfair to private businesses and bad for the populace as a whole. It means that consumers will never reap the benefits of competition. When government owns and operates the facilities that produce a product or service there is no return on investment and

hence little or no capital formation as a result of the production. Capital contracts on the private sector side and jobs are lost.

Taxpayers Get Stuck With the Bill

Some compare broadband to the basic services provided by government such as roads, water and sewer systems. But all these systems receive heavy taxpayer subsidies. There isn't a city on planet earth whose mass transit system isn't heavily subsidized by taxpayers and losing money. There is a limit to just how much the public should be required to subsidize. Communications products have an extremely limited lifespan, becoming obsolete almost immediately. How much stranded investment in antiquated infrastructure should taxpayers be forced to eat in write-offs?

Again and again, municipalities have gotten into the telecommunications business only to see their efforts fall apart. A 2002 study of municipal networks revealed customer enrollments far below projections, costs more than double projections, and operating losses extending indefinitely into the future. Higher taxes and political scandals are the hallmark of municipal networks. Marietta, Georgia took a \$24 million loss. One Washington public utility district has been absorbing losses of \$15,000 to \$17,000 per year. Trion, Georgia spent \$1,800 per resident, reducing a municipal budget surplus to 10 cents on the dollar. The so-called Utopia Project in Utah took a tremendous hit when Salt Lake City officials announced that they would not back the program financially.



Government Ownership Invites Content Control

One ominous threat of municipal networks is the potential for government content control. This is why, with rare exception, government entities in the United States do not own or operate radio stations, television stations or newspapers of general circulation.

In considering a Missouri law prohibiting municipalities from getting into the telecommunications business, the Supreme Court explained that states have the right to bar government ownership and operation of communications networks to protect their citizens' interest in a free market and free speech. Nine states including Missouri have similar laws. Others are likely to follow suit in the coming 2005 legislative sessions, most recently Pennsylvania.

Once government controls the distribution of broadband, control of content is the next step. Every totalitarian regime in the history of the modern world has controlled the delivery of communications. It is a dangerous direction to travel.

Voice over IP (VoIP)

The Voice over Internet Protocol (VoIP) application uses software instead of traditional circuit switching to allow telephone calls and other messages to be sent over computer networks. VoIP converts analog voice signals into digital data packets, which provides real-time, two-way transmission of conversations using Internet Protocol (a network that sends data in the form of "packets." Each IP packet includes a header specifying the packet's source, destination, and other information about the data, as well as the message data itself.)

While VoIP has been around since the mid-1990's it was mostly a technophile toy. Today companies are offering VoIP and new customers are switching over to VoIP in ever increasing numbers. Consumers and businesses are quickly responding to the convenience and technological advantages of VoIP.

VoIP—Not Just Phone Service

It is popularly believed that VoIP is “phone calls made on the public Internet.” But VoIP messages (much more than phone calls) can also be sent over managed data networks, using leased lines, a company's own fiber, or frame-relay connections. VoIP is about email and other message formats as much as voice, and it is a mistake to view it as a mere substitute for traditional phone service—or to enact policies that treat it that way, ensnaring software in archaic regulation.

Recently, the FCC has ruled that the characteristics of VoIP “preclude any practical identification of, and separation into, interstate and intrastate communications for purposes of effectuating a dual federal/state regulatory scheme.” Thus, the FCC treated VoIP as interstate for certification and entry purposes, preempting such state regulation. This makes sense, given that VoIP carriers' will naturally seek to offer consistent pricing and bundles of service nationwide. The FCC has otherwise tended to treat VoIP much like traditional telephone service, requiring VoIP to offer 911 service, to pay universal service charges, and to comply with the Communications Assistance for Law Enforcement Act (CALEA), a law passed to enable wiretapping of modern networks. So far, however, VoIP carriers have not been required to pay access charges. The FCC's attempt to bring VoIP within the



traditional regulatory regime will create problems going forward, as VoIP is combined with converging technologies that have been immune from such regulation, such as Wi-Fi.

VoIP—Private versus public

Voice services are (so far) are of two types. One type is created by running software over a private network; such “private” services are able to provide service quality, at lower cost and such features as 911 service. The quality and price are similar to a telephone network, though international calls are cheaper. An example is the VoIP service offered by Comcast. Another type routes packets over any ordinary “public” Internet route; these packets are given no higher priority than any other transmission, so the message quality may suffer as some packets lag behind (“latency”). Examples include Skype and Vonage. The public service is fine for occasional calls, but most businesses opt for the private service.

VoIP Taxation and Charges

The federal government has levied a tax (Federal Excise Tax or FET) on communications since 1898 to fund the Spanish-American War, and now while not collected the law still remains. States have taxed communications at various times and at various rates for almost as long. The time has long passed to have a serious discussion of whether communications should be taxed. Recently, the IRS categorized bundled VoIP packages as tax-exempt.

Other taxes levied by the federal government include those intended for the Universal Service Fund and for compensating traditional telephone companies for the use of their phone lines, so-called access charges. Phone

companies are already fully compensated for their costs when Internet phone calls are terminated on their networks. Some rural carriers, however, continue to be heavily dependent on access charges.

It makes no more sense to apply these taxes to VoIP than to email, Instant Messaging, or online computer games that include a communications link. Taxes, whatever their original intent, should not be allowed to creep into future technologies and spread accordingly. Since old-style telephone regulations should be phased out, we should not expand their domain by applying them to VoIP.

Stated most broadly, if law makers decide that communications should be taxed, then communications taxes need to be reformed overall so that there is a level playing field.

Net Neutrality

So what is network neutrality besides a made-up inside-the-Beltway catchphrase?

Supporters want to require companies that operate networks over which access to Internet content is provided to treat all of the data flowing through those connections (known as “content”) the same.

That means a teenager’s IM (instant messaging), an emergency phone call or a televised presidential address. Every single item gets the same service regardless of importance, relevance, size or financial clout.

While such equality might sound attractive, it’s the sort of regulation that will stifle Internet innovation.



Some of the network operators that pipe the Internet into homes and businesses are considering offering willing content providers improved services, such as faster and/or more reliable service and high-definition streaming video of their content. Under a net neutrality law, they couldn't do that.

Supporters of net neutrality say they fear that unless they get a neutrality law, a two-tiered Internet will emerge—where the biggest and richest providers get the best treatment, while the others are left with slow and inferior connections. And the more populist proponents worry that if Internet network operators can charge content providers more, then the costs will eventually be passed on to consumers.

A Little Internet History

The proponents of Net Neutrality often present the idea as if it is nothing new; it is just more “common carrier” regulation. Others have compared it to the public highways. These comparisons are extremely misleading. Common carriage spawned an enormous regulatory complex that left telephone network technology stagnant and squashed competition; it is not remotely appropriate to rapidly evolving complex networks. Legislators have generally refrained from expanding this type of rule to new networks such as cable television. Where it has been attempted (video dialtone) it has flopped. As for the highway comparison, trucking companies that put heavy wear and tear on the roads must pay heavy use taxes; many busy routes are supported by tolls. The Internet needs traffic management too.

The truth is the Internet, a network of networks and mostly privately owned, has never been actively regulated to guarantee “net neutrality.” Some networks have paid to have traffic carried on by other carriers for years; others do not. These are known as “transit” and “peering” arrangements. For quality of service, some packets need to take priority over others—streaming video isn’t very appealing if the picture freezes in the middle. A song or a phone call routed over the Internet won’t sound very good if the sounds are not reproduced at the right tempo. Medical and emergency calls need to take high priority. Networks routinely block and filter traffic from black-listed sources known to deluge others with junk email. A network struggling with capacity issues—perhaps a new satellite-based Internet service—can hardly give everyone the same priority. A network struggling with viruses, worms, and denial-of-service attacks can hardly refrain from blocking content.

Who Will Pay for New Networks?

High capacity new services are a costly investment. In fact, Craig Moffet of Bernstein Research estimates that the cost of supplying consumers with high-capacity new services could cost \$600 per month per household.

Service providers will not be able to improve on the current system if they must bear all of the costs themselves. So, just like in all companies the costs of improved services get distributed.

Broadband Competition as a Solution

The network neutrality debate has arisen from concerns that broadband markets are still not competitive enough. We believe that these concerns are unfounded. If, how-



ever, one assumes for the purpose of argument that there is some truth to those claims, net neutrality is still the wrong solution.

Instead, policies that facilitate and allow greater broadband competition should be pursued. Given that no problem has yet arisen, any regulation would be premature and pre-emptive. If bad acting does occur and the FCC and Justice Department are impotent, then regulatory legislation could be pursued.

Price Regulation Among Carriers: Access Charges

The Net Neutrality debate calls for us to revisit just how complicated regulation of the relations between carriers can get. This section discusses regulation of the price of services provided by one type of carrier to another. The lesson is that intervention with markets for any social goal can be very, very difficult to get rid of, long after almost everyone has agreed that it ought to go.

What Are Access Charges?

Access charges, a type of inter-carrier compensation, are payments made by long distance telephone carriers to local phone networks to carry long distance calls to their destinations. Before 1984, when the Bell System was still one company, long distance prices were held high to keep local prices low. After the breakup, regulators created access charges, keeping long distance prices high to preserve this subsidy. But competition forced long distance prices down, so the system of access charges became untenable. The FCC has jurisdiction over interstate access charges,

and states have authority over intrastate charges. The structure of access charges affects universal service, competition between phone companies, and the development of access charges cause many economic distortions.

New technology, service options and choices, and pricing have eliminated the differentiation between local and long distance. Basing a system of payments on long distance carriage becomes a distinction without a difference. Inter-carrier payments should be harmonized for all traffic or to prevent gaming the system.

Bringing Access Charges to Cost

The FCC has begun to bring interstate access charges down to cost. Many states, such as Texas, Minnesota, Maine, Ohio, Florida, New Mexico, Colorado and California have sought to do the same with intrastate access charges. This may mean letting local rates rise, while long distance rates fall; it is called rate rebalancing.

Fears that rate rebalancing would force the poor to give up their phone service have proven unfounded. The demand for basic service remains strong. For example, in Wyoming basic residential rates went from \$14.64 in 1995 to \$23.10 in 2002, with no material effect on subscribership. Falling long distance prices help low-income consumers, especially in isolated areas. And letting local prices rise somewhat makes local residential service more attractive to potential competitors; no one wants to compete against a company whose prices are below market rates.

Although bringing access charges to cost is desirable, ultimately, freely negotiated charges should prevail.



A CLOSER LOOK AT SPECIFIC SECTORS: FAMILIAR SERVICES & PROBLEMS

This section reviews policy discussions defined by and confined to well-recognized categories of service. The Communications Act of 1934 originally distinguished broadcasting and telephone service; cable and satellite were added on over the years. As convergence ramped up, these separate legal regimes made much less sense. But the regimes have served to insulate traditional firms or other powerful actors from the need for change, and so are, unfortunately, somewhat self-perpetuating.

Cable (Video)

Cable television took off in the mid-70's as an alternative to broadcast television. Municipalities were the first regulators, then the FCC, and finally Congress introduced federal regulation—the 1984 Cable Act. At first, most cable franchises awarded monopolies, but the 1992 Cable Act generally requires local governments to allow competition. Meanwhile, cable companies expanded their offerings to include telephone service and broadband Internet service. They compete with phone companies in markets for voice messages and broadband, ISPs, and satellite video services.

Are Cable Prices Too High?

Activists are fond of comparing cable rates to the consumer price index (CPI). But the CPI is a rough measure of inflation, not a standard by which to judge prices of individual products—especially when the product changes substantially in quality and production costs over time, as cable has. Furthermore, the idea that prices should follow costs in some wooden manner is wrong. If cable companies' prices and profits do rise above costs, this will bring new competitors and new innovation into the market. Any form of price regulation of cable threatens not only investment in cable, but cable competitors as well.

Cable Channels a la Carte

Proposals at the state and federal level have surfaced to force video providers such as cable companies to offer their channels unbundled, so a subscriber could buy only one or two channels instead of an entire tier. Some have argued that this is needed to protect consumers from high cable prices. The FCC has entertained the idea as a way to help parents control what their children see on television.

Requiring the unbundling of cable channels is a poor idea. Many subscribers would be likely to subscribe only to the most popular channels. But most cable revenue comes from just a few popular channels; the costs of developing and offering new and “niche” channels can only be recovered by bundling. The “a la carte” policy risks decimating these new and niche channels. These channels, including educational channels like the Science channel, are privately funded and not dependent on government subsidies, as is PBS.



Some argue that forcing video providers to sell channels one by one will provide some greater parental controls, but parents already have many tools to restrict their children's access to inappropriate video content. Many choose not to use these tools; many do. As more television programming is released on DVD, parents can opt out of cable programming altogether now. Legislators should be wary of catering to only a small proportion of sensitive but vocal viewers.

Competition continues to grow between different types of video offerings, from Netflix to broadband to satellite and beyond. This new market gives consumers more choices than ever; if there is consistent demand for a la carte programming and it is a viable economic model, it will be provided. Verizon, for example, plans to launch a fiber-optic based TV service in Massachusetts and has announced its intention to use a la carte pricing. The best policy is to leave this market alone.

Traditional Local Telephone Competition (Voice)

The Telecommunications Act of 1996 (The Act) was intended to provide a framework for efforts to bring competition to all local service markets. But rather than looking to cable, wireless, and others to build new networks to bypass aging copper facilities (facilities-based competition), regulators encouraged competitors to piggyback on the old networks through resale, interconnection, and unbundling at economically unrealistic rates.

An overview of the local telephone market over the past decade shows the result of failing to encourage facilities-based competition; a tangle of regulation, strife, and litigation, leading to recession and still more litigation. But there is competition in local phone service—increasingly from wireless, cable television and Internet telephony providers able to largely bypass the old networks and insulated from most destabilizing regulatory decisions except in places of bottlenecks.

In fact what has emerged in spite of regulation, legislation and adjudication has been an explosion of technological innovation and the development and deployment of multi-modal data transmission and distribution. Today Americans have more options and choice than ever could have been anticipated just 10 years ago. Nevertheless this development has been hampered by public policy that seems designed to resist and impede competition rather than to facilitate it—the original intention.

Interconnection

The Act requires all telephone companies to physically connect their networks to those of other carriers (wireless, long distance, or local), enabling subscribers of one service to call subscribers of another service. Physical interconnection enables the interconnection of services; that is, that one carrier will sometimes carrier another carrier's messages.

What Price Intercarrier Compensation?

When a local carrier connects with a long distance carrier, the local company charges the long distance carrier fees known as “access charges.” When two local carriers interconnect, the fees are called “reciprocal compensa-



tion.” This distinction is outdated and is currently being reviewed by the Federal Communications Commission (FCC). Under both systems, the calling party’s network pays. As time has passed the distinction between local and long distance has essentially evaporated.

Access charges and reciprocal compensation prices are regulated. The challenge for regulators is to move toward negotiated prices or to prices that better reflect costs, such as “bill and keep.” (Under “bill and keep” carriers bill only their end users for the costs of connecting a call, not other carriers.) Due to the unpopularity of bill-and-keep with rural carriers unwilling to raise prices to recover their real costs and state regulators unwilling to place further pressure on the universal service fund to subsidize the system with tax dollars, the FCC now favors charging all carriers the same very low termination rate. A better approach would be to allow prices to rise to reflect real costs, attracting more competition, and to target assistance to customers who need it in rural areas.

Collocation

Collocation, one way to connect networks, is the placement of a competitor’s equipment in the incumbent telco’s central switching office to enable interconnection. The justification is that the incumbent will give itself an advantage over interconnected competitors if their equipment is not also located close to key equipment. Collocation raises concerns about the abuse of one company’s equipment by another’s employees. This is a consequence of rules that force the sharing of property, and is like requiring a Ford dealership to share its showroom with Toyota. The best solution is to set ground rules that encourage the technical details of interconnection to be negotiated.

Unbundling

Under the 1996 Telecommunications Act, incumbent local exchange companies (ILECs—the traditional local phone companies) must offer the use of parts of their networks (unbundled network elements, or UNE's) to competing local exchange carriers (CLECs—newer companies also offering local phone service) without which the CLECs would suffer “impairment.” The perennial question is, which elements, and at what price? This question has been endlessly litigated.

In March, 2004, the D.C. Circuit Court of Appeals set aside key aspects of the FCC's rules for the third time in *USTA v. FCC*. The FCC issued new rules in March of 2005, which were again challenged in court.

The problem with the FCC's initial approach to UNEs is that, if CLECs can cheaply gain access to ILEC's equipment, they little reason to build out their own networks. Monopoly becomes a self-fulfilling prophecy. The “competition” in local phone service resulting from this does not deserve the name. Competition in phone service from resale is competition on price alone, not on the technology or the basic structure of the business and network. Some CLECs such as Telscape in Arizona, a bilingual network, understood that to truly offer a competing product, they needed their own networks—and proved it is possible to build them. Innovation drives down the cost of building new networks, which allows new entrants to offer customers a wide range of services for a competitive price.



TELRIC Pricing

The FCC instructed states to set the prices for unbundled elements using a formula called “total elemental long-run incremental cost” (TELRIC), the price based on the cost of a hypothetical, perfectly efficient future network.

TELRIC is very low compared to actual costs—the perfect future network is assumed to be cheap, real networks aren’t—so CLECs were better off piggybacking on the old networks than building their own. The FCC’s data show that CLECs owned fewer access lines in 2002 than in 1999. TELRIC ultimately should be replaced by negotiated prices, and in the interim by some method that reflects current costs.

Impairment

The Supreme Court ruled that the FCC may not interpret “impairment” to give CLECs access to almost everything, saying that the FCC must consider whether CLECs could find the element they needed outside the ILEC’s network. (*AT&T Corp. v. Iowa Utilities Board*, 525 U.S. 366, 387-92 (1999)). The D.C. Circuit Court then reminded the FCC again not to discourage facilities-based competition by paying closer attention to real costs and particular markets. The D.C. Circuit later upheld the idea that impairment occurs when lack of access to an element created a barrier to entry. Such barriers include economies of scale, sunk costs, first-mover advantages, and barriers controlled by an ILEC. But the Circuit Court continues to question other elements of the definition.

Which Network Elements?

In 2004 the D.C. Circuit upheld the FCC's determination that broadband (fiber to the home) networks, hybrid loops with packet switching, and line-sharing need not be unbundled. (Line-sharing lets competitors use part of the local loop to carry data traffic, while the ILEC used another part to carry voice traffic.) The Court explained that without evidence that CLECs are impaired without those elements, forced sharing "would skew investment incentives in undesirable ways...[and] inter-modal competition from cable ensures the persistence of substantial competition in broadband."

The Court set aside, however, the FCC's delegation of some decisions on UNEs to the states, and the FCC's creation of the Unbundled Network Elements-Platform (UNE-P) rules, which allowed competitors to put together all UNEs into a single bundle. On remand in 2005, the FCC added mass market switching and dark fiber to the list of elements that need not be unbundled, as well as some high-capacity voice-grade lines (known as DS1 & D3). The FCC's elimination of mass market switching from the list of unbundled elements in effect phased out UNE-P. CLECs were given a transition period to wean themselves from the affected elements.

State Resistance, Market Response

As the FCC removed additional elements from its "to be unbundled" list, some state utility commissions required CLECs to negotiate for continued access (Michigan and Virginia); others maintained that current CLEC contracts remained valid or were to be phased out under "change of law" clauses (North & South Carolina). But still others sought to maintain unbundling of elements under state



regulatory authority (Illinois, Georgia). The courts generally found that the FCC's action had preempted this (see, e.g. *BellSouth Telecommunications Inc. v. MCIMetro Access Transmission Services, Inc.*, 425 F.3d 964 (11th Cir. 2005)). However, not all state PUC regulation of unbundled elements was preempted in all circumstances, leading to a confusing array of cases.

Perhaps state resistance stemmed from fears that competition would simply not survive without generous subsidies. This view was unfortunately promoted by public utility regulators and consumerists who were convinced that deregulation would reduce service and drive up the cost of service to the end user. And, of course, CLEC's did nothing to dissuade them of this view. Was the idea that weaning CLECs from UNE-P and too-generous UNE's would lead to more sustainable competition—to building facilities and to negotiations—just too good to be true?

Events Since Prove the Pessimistic PUCs Wrong

Initially, CLECs panicked. CLECs such as Covad, that already had substantial investment in its own facilities, were best able to weather the storm. Others have made such investments or prepared to migrate to Internet telephony. Many have negotiated access with ILECs, and some have proposed that they share one another's networks. The changes made wholesale business more attractive to the ILECs, who negotiated hundreds of thousands of access lines with CLECs. Verizon created a new wholesale business arm called "Wholesale Advantage." The 1996 Act envisioned such agreements, but few negotiations took place until now. Investment capital continues to be available to CLECs with a solid plan, especially those with their own facilities.

The reduced scope of regulatory activity helped both CLECs and ILECs, in reducing uncertainty and bringing stability to the legal environment. Some companies will fail. That is the nature of the free market. But this is not the end of competition, rather it marks its movement onto more solid footing. Competitors forced to share facilities will always end up in court accusing one another of sabotage; by comparison, a negotiated relationship begins with good will, the recognition by both parties that the arrangement is mutually beneficial.

Performance Measures

Regulators use performance measures, such as counting the seconds it takes for an ILEC's computer to respond to a request for interconnection or the number of days the company takes to respond to a customer's request for service or repair, to assess customer service and progress towards competition. Performance measures have their place, but have been misused. Sometimes, for example, an ILEC must purposely slow down its network to accommodate the inferior technology of its competitors. And some measures are impossible to comply with; for example, until recently Qwest was required to repair all phones within two days or pay an automatic annual fine of \$1 million.

Performance measures have proliferated to the point where literally millions of measurements must be tracked and reported. Performance measures have become a revenue-generator for regulators and competitors, and a means of harassment rather than guarantors of competition.



It is the telecommunications consumer, of course who ultimately bears the burden of the staggering costs of this irrational system.

The expansion of performance measures is a prime example of the tendency of regulation to lose touch with reality and become an end in itself. It is abusive and unnecessary. Growing inter-modal competition will best improve customer service.

Local Competition Trends

The regulatory framework created by the FCC and many states after 1996 was contentious, uncertain, and overly complicated, competition in local phone service took a different direction. CLEC's have captured some market share. But competitors able to cut the regulatory Gordian knot and bypass the ILEC's networks show tremendous promise. And while still interdependent on phone networks because of the needs of customers to communicate across systems, the leaders are providers of cable telephony, Internet telephony, and wireless. Their market is trending sharply upwards.

- ILECs are losing local access lines at a rate of about 5 percent a year, faster than projected a few years ago.
- Gartner Research projects that residential land lines will fall from 114 million in 2005 to about 88 million in 2009.
- As with cell phones, customers familiarity with VoIP in a business context will open them to residential use, with VoIP growing from 1.2 million business subscribers in 2004 to 4.2 million business

users in 2005. eMarketer forecasts 32.6 million US VoIP subscribers by 2010, about 40% of all broadband households.

- The FCC reports that at the end of 2004 the 194.5 million mobile phone subscribers surpassed landline phone subscribers (172.1 million) for the first time.
- Worldwide, more and more households have mobile phones *only*.
 - ✓ In the Netherlands, the number is increasing at a rate of 1 percent per quarter, and reached 16 percent in 2005.
 - ✓ In Finland, the number is 39 percent.
 - ✓ In the United States, the number has grown from 1-2 percent in 2001 to 6-7 percent in 2004, to about 12 percent today.
- The FCC estimated in 2003 that about 30 percent of wireline minutes had been displaced by wireless.
- One in 10 households uses an “alternative provider” such as cable or VoIP, with 3 or 4 percent of households reporting they intend to switch in the next year, and 50 percent of households reporting that they had heard of VoIP.

Best Practices for Local Phone Competition Going Forward

- Ensure that utility commissions, legislators and policy makers in political subdivisions (cities and towns) understand the importance of facilities-based competition and a future-oriented view of competition in the local exchange.



- Finish the process for allowing former local monopolies to provide long distance service; empirical studies suggest that this also accelerates local competition.
- Back off of price regulation in local markets to increase the market penetration of alternatives such as wireless (many states have done so, including Texas, Idaho, Nebraska, Utah, Montana, South Dakota, Wyoming, Indiana, New York, and Kansas) but some states have slid backwards (with Florida repealing a law allowing a rate hike in May of 2006) and others have barely moved forward at all (such as Alaska and Hawaii, still under rate of return regulation).
- Remind utility commissions not to reward parties to disputes for resorting to the regulatory process instead of negotiations.
- Do not subject new applications such as VoIP to outdated regulations such as those applied to wireline phone service, but do give VoIP providers the rights they need to be able to exchange traffic with all types of carriers.

Satellite

The word “satellite” doesn’t have the romance that it once did. There are so many satellites orbiting the earth that it is surprising they haven’t bumped into each other. But satellite technology is making its mark on communications. The penetration of satellite into the broadcast television markets is as high as 25% in some areas and higher in places where cable infrastructure is hard to

place. Certain rural areas are wholly dependant on satellite for video entertainment. And while satellite penetration has increased, the price has decreased, now making satellite competitive with cable. But the real value of satellite may be in its potential as a data medium, distributing two-way voice and Internet services.

Research and Development

Satellite creates the opportunity for almost limitless transmission of data. Research continues on ways to provide Internet services and two-way voice offerings using satellite technology, though these services are not quite ready for commercial use either in business or residential markets. For years, satellites have been used to transmit two-way voice between points of presence in the telephony chain, but multiple media transmission of mixed data media is not yet marketable. If policymakers continue to limit regulation and resist the temptation to apply new rules or revenue pressures to satellite we can expect a broader array of satellite services in the near future.

The Future of Satellite

As they say, the sky is the limit—a cliché, but very true of satellite. Some see wireline communications as a twentieth-century technology and terrestrial cellular and microwave as an interim technology. If so, satellite offers the next generation technology with modest infrastructure needs and long-term product availability.



Wireless

While making a voice call on a mobile phone may be the most familiar wireless service, wireless now has many other uses. Wi-Fi and cellular lets computer users access the Net in airports and coffee shops, and in an ever-widening host of other locations. Soon Wi-Max, a hyper version of Wi-Fi. may soon cover the country coast to coast.

Wireless competes with traditional local phone service. More and more homes and small businesses use wireless instead of wire-line. Tomorrow's consumers (today's teenagers) rely on cell phones and largely dismiss wire-line technologies. And competition within the wireless community is fierce. Some argue that wireless needs more regulation beyond that already in place at the state and federal levels. But this would only impede the spread of service to consumers and protect wire-line service from competition.

Spectrum Markets

The management of the electromagnetic spectrum used by wireless devices is one of the most important issues in technology policy. In the nineteenth century, the system that allowed pioneers to stake a claim for plots of land allowed land to be put to its best use. For wireless communications to thrive, the ground rules should support a market for spectrum.

Spectrum Basics

The wavelengths used by Wi-Fi, WiMax, radios, television, satellite transponder, mobile phones, and microwave dishes are called the “electromagnetic spectrum.” Radio waves are long waves that pass through solid objects and travel great distances. Radio waves (“ultrasonics”) are used in broadcasting by AM radio (1 megahertz) and FM radio (100 Mhz), cellular phones (800 Mhz), and digital phones (1850-1900 Mhz). One hertz is about one beat per second; a Megahertz is one million hertz, a Gigahertz one billion hertz, and a Terahertz one trillion hertz. Microwaves are short waves that bounce off rain drops or snow flakes and travel short distances (2, 450 Mhz). Television uses both ultrasonics and microwaves. Wi-Fi uses spectrum at 2.5 and 5.0 Ghz. Terahertz technology is still in the experimental phase, coming into use in medical devices and astronomy.

Most wireless devices up to and including WiMax today are third-generation devices, known as 3G; some networks added 3.5G services such as High-Speed Downlink Packet Access (HSDPA) in 2005. Pre-4G services such as Ultra Mobile Broadband (UMB) will begin to be deployed in 2008 or 2009. A fourth generation (4G), expected to support affordable mass-market broadband, is anticipated for 2012; these will be fast all-IP devices capable of supporting about 1 Gbps stationary and 100 Mbps mobile. The FCC’s provision for 4G includes a grant to new Ultra Wide-Band (UWB) overlapping with the spectrum used by 3G WiFi services.

How much information can be carried over the spectrum is determined by the transmission and receiving equipment at either end. The technology to use new frequencies and tune out interference keeps getting



better. But spectrum is economically “scarce” in the same sense that a plot of land is “scarce;” the frequencies that can be used at any given time are finite, and two radio stations in an area cannot broadcast over the same frequencies at the same time. So a system is required to determine who can use what when.

Spectrum Reform Policy Choices

In the 1920s and 1930s the dominant view was that spectrum needed to be managed by the government to allocate this “scarce resource” so as to protect the “public interest.” Long ago, economist Ronald Coase pointed out that this was an error; there is no reason not to treat spectrum like property. Spectrum could be transferred freely, like real estate, with ground rules to protect against interference. This would avoid the stifling slowness and bias against new technology and competition that comes with government licensing. Some economists estimate that the FCC’s decade of delay in setting aside spectrum for cellular phones cost \$86 billion in lost benefits to consumers.

The shortcomings of command and control, top-down licensing have become more and more apparent, starting in the 1980s, when demand for wireless telephony took off. The Internet and the increasing interest in wireless everything continues to explode demand for new spectrum. The question is, what model should replace command and control? There are two main choices.

One is the model suggested by Coase, creating markets in spectrum by setting ground rules akin to those for real property. A free market in spectrum would allow more rapid change and competition, and allow spectrum to move to its highest valued uses. Congress and the FCC

have moved with painful slowness towards this goal. But by 2000, still, only six percent of the spectrum was managed in a way consistent with market forces.

The second idea for reform is the idea of a spectrum commons open to unlicensed users. Under this second model, interference is avoided by “intelligent” devices such as those used for spread spectrum, “cognitive radio” and “mesh networks.” The FCC has taken some experimental steps toward this model, releasing spectrum for unlicensed low power uses such as Wi-Fi, Bluetooth, and garage door openers. The unlicensed model, however, has its limits. In densely populated areas with heavy spectrum use, and for more powerful transmissions, clear ground rules akin to the property rules against trespass would do better to control interference.

A property-based market system would allow owners to transition to a commons for unlicensed uses by contract. But the uncertainty of rights in a commons might not allow an easy transition to a property system even if the latter proved optimal. A property rights approach is therefore preferable to a commons approach as a general rule.

Building Blocks for Markets

Markets in spectrum need the following basic conditions:

Certainty. Investors need stable and predictable long-term rights in spectrum—including protection from interference and from sudden policy changes or government seizures. The transition from command and control to markets itself causes some uncertainty, but a systematic approach that compensates legacy spectrum holders or allows them to negotiate with newcomers can control this.



Transferability. The spectrum holder should be free to trade or lease spectrum without cumbersome licensing or other restrictions. Spectrum users have the right to sell spectrum to others in the private sector, to lease it, or to offer a share in the venture to a new investor. The FCC has created a framework for such secondary markets, starting with wireless phone companies. Less progress towards secondary markets has been made in broadcasting.

Flexibility. The holder of spectrum should be free to use the spectrum to provide any service the market demands. Licenses for personal communications, or “PCS” services permitted users to employ the spectrum for virtually any non-broadcast use.

Availability. Spectrum should be made available to the private sector to be used to provide services, not held dormant or reserved for government users. In 1993, Congress authorized the FCC to award wireless licenses through auctions; some progress has been made in releasing underused government spectrum to the private sector.

Spectrum Auctions—Cash Cow or Economic Engine?

The spectrum is valuable property—all the more so because the government maintains a choke-hold on the supply. Some of the FCC’s spectrum auctions have raised billions, others much less. In the 1997 Budget Act, Congress required the FCC to set minimum opening bids, unless this is not in the public interest. This is not the best policy. The primary benefit of auctions is not raising money—it is the speed and efficiency with which they move spectrum into use in response to consumer demand. Setting high minimum bids can discourage small entiti-

ties from bidding. And it tempts Congress to release spectrum into the market in tiny increments, slowly, so as to hold up the price. In the worst case, this leads to the opposite problem, wildly inflated bids and the bankruptcy of participants.

The best policy is to not consider how much money will be raised in setting up auctions. Even if some spectrum is sold cheaply or before its optimal use becomes clear, auctions will be a success simply because they get the spectrum out to the private sector. Once spectrum is released and can be traded, the market will set the value correctly regardless of whether of the price in the original auctions.

Free Government Spectrum for Private Use

Policymakers should also seek to move spectrum from government uses to private users. The Department of Defense, the FAA, public safety, and other public sectors users enjoy preferential use of a great deal of spectrum, most of which is used very inefficiently.

Military and public safety interests argue that that spectrum must be set aside for government use. This makes no more sense than setting aside radio operators, cars, or paper for the exclusive use of the government. There is no reason that government cannot bid for these resources in competition with the private sector, or contract out with private entities to provide those services.



Spectrum and the Public

One obstacle to spectrum reform is the idea that spectrum is held in trust for the public. This sounds noble. But it makes no sense from a technological or policy standpoint. The spectrum, a set of wavelengths like sound or light or heat, has absolutely no use or value apart from the privately created and owned transmission and receiving equipment at either end. Economically, spectrum is just like land; giving it to the government to manage in trust for anyone courts disaster, just as nationalizing farmland has been in various experiments around the world. It is in everyone's interest to move the spectrum out of top-down control.

Wireless Consumer Protection

In the spring of 2004, California adopted a controversial telecommunications “bill of rights” for consumers, motivated by complaints about wireless service—so controversial that the California regulations were suspended after adoption. Activists have expressed the view that this law should be adopted by other states. But such regulations are a step backward. They will add to the costs and risks for wireless companies, especially smaller, newer firms, and ultimately reduce competition, a much better way to protect consumers. The California commission is likely to review this “bill of rights” in light of criticism that it goes too far.

Public Safety and Wireless

Federal policymakers are moving more of the radio spectrum into private hands through auctions and other reforms. This will speed the offering of wireless services to consumers. Traditionally, large swaths of spectrum have

been reserved for governmental purposes, and are often used very inefficiently. Public safety groups are concerned that spectrum will no longer be reserved for them. But there is no reason that public safety organizations could not bid for spectrum and communications services in the market the same way they buy fuel or desks. Keeping spectrum off the market will only exacerbate shortages.

Further if policy makers in the legislative arenas feel that public safety is essential within the provision of communications then they have the authority to provide for it directly through the appropriations process. We pay for police, their equipment, their vehicles and their munitions through the direct appropriations process.

So too should we be providing for their methods of communications in that manner.

Wi-Fi

Wireless Fidelity, also known as Wi-Fi, is a wireless connection to the Internet. More technically, it is a type of local area network (LAN) that uses the Institute of Electrical and Electronics Engineer's (IEEE's) 802.11 "family" of wireless standards. Sub-stratospheric data signals are transmitted from a base station within a limited space; the zone of connectivity is known as a "hot spot." Wi-Fi can be as fast or faster than current broadband and DSL service. It is commonly used in hotels, coffee shops and other retail and commercial locations, and residential use is growing. Base stations in the home let multiple users access the Internet throughout the residence, un-tethered by any cables.



Widespread use of Wi-Fi has expanded competition in data transmission. In particular, it reduces the need for inside wiring and rewiring of commercial and residential properties.

Worldwide Interoperability for Microwave Access (WiMax)

Worldwide Interoperability for Microwave Access or WiMax is another standards-based sub-stratospheric wireless technology that provides high-throughput broadband connections over longer distances. WiMax uses the IEEE's 802.16 standard for wireless metropolitan area networks (WMANs). The uses for WiMax include the "last mile" between network nodes and end users' premises, that is, the final distribution leg for broadband, Internet hot spots, or cellular services, in place of fiber or copper cable. This will reduce infrastructure costs, ultimately reducing costs to the consumer.

Current WiMax broadcast technology offers connections at relatively high speeds (up to 75 Mb/sec.) and can transmit signals from the network's point of presence to a master receiver as far as 30 miles. The local transmission is received in homes or offices at a WiMax base station, the coverage of which is between three and five miles. The technology is developing quickly, meaning that WiMax could be in widespread use soon.

WiMax and Wi-Fi Policy Prescriptions

WiMax and Wi-Fi have the potential to speed competition in Internet and telephone service markets, even in rural areas where the costs of laying cable are greater. The best policy is to avoid entangling these new technologies in old-style regulation, spectrum licensing, and taxes.





GLOSSARY OF TERMS

Access Line: The circuit used to enter the communications network.

Access Network: The part of the carrier network that reaches the customer's premises. The access network is also referred to as the local drop, local loop, or last mile.

A La Carte: Mandating consumer choice by prohibiting the bundling of cable and satellite channels.

Analog: Analog technologies store and convey information by using a pattern (such as a wave) to represent a similar pattern. An analog device such as a record player, for example, converts impressions on a vinyl disk into an analogous sound pattern. Conventional radio and television signals are analog as well.

Asymmetric Digital Subscriber Line (ADSL): A data communications technology that can “piggyback” a standard voice telephone connection.

Backbone: The primary transmission path between network segments, or a major pathway within a network.

Bandwidth: (1) A measure of spectrum (frequency) use or capacity. For instance, a standard telephone conversation uses a bandwidth of about 3,000 cycles per second (3 KHz). A TV channel occupies a bandwidth of 6 million cycles per second (6 MHz). Cable systems occupy 50 to 300 MHz. (2) Also, the measure of capacity of a transmission channel.

Broadband: “True” broadband transmits voice, data, and video at rates of at least 1.5 Mbps (although today’s networks commonly offer about 500 Kbps). Alternatively, “broadband” refers to any high-speed, always-on Internet connection.

Central Office (CO): A telephone company building in which end users’ lines terminate at switching equipment that connects other end users to each other. Also known as End Office.

Circuit: A switched or dedicated communications path with a specified bandwidth (transmission speed/capacity).

Circuit Switched Network: This type of network carries information on a dedicated, end-to-end connection established by switches between two connected parties for the length of their call. The public switched telephone network (PSTN) uses circuit switching.

Customer Premises Equipment (CPE): Telephone terminal devices, such as handsets and private branch exchanges (PBXs), located on the customer’s premises.

Dedicated Line: A communications circuit or channel provided for the exclusive use of a particular subscriber.

Digital: Digital technology stores and conveys information in discrete binary units, using electrical signals or flashes of light to represent ones and zeros.

Digital Subscriber Line (DSL): Broadband technology that works over regular copper telephone cabling.



Facilities-Based Carrier (FBC): A carrier that builds and uses its own facilities to provide service, rather than using the facilities of others.

Franchising: The system of licensing of video and telecom providers that authorizes rights of way in exchange for minimal service provision and revenue generation from the end user.

Hot Spot: A place where a Wi-Fi connection to a wireless local area network offering access to the Internet may be made.

HSDPA: High-Speed Downlink Packet Access is a protocol for 3.5G wireless services, offering data download speeds up to 14 Mbps and upload speeds up to 1.8Mbps.

IEEE: The Institute of Electrical and Electronics Engineers (IEEE) is a technical professional society that fosters the development of national and international technical standards.

Incumbent Local Exchange Carrier (ILEC): The traditional local telephone companies such as the former Bell companies, or local exchange carriers designated as such by state Public Utility Commissions.

Integrated Services Digital Network (ISDN): A digital telephone line that can be used for voice, fax, and data communications like a regular telephone line, but can transport data five times faster (or more) than a 28.8 Kbps V.34 modem and allow you to talk on the phone to one person while sending data to another.

Interexchange Carrier (IXC): A long distance phone carrier, like AT&T, MCI, or Sprint, as well as ILECs that have qualified to provide long distance service.

Local Access and Transport Area (LATA): These regions were created by the antitrust decree that broke up the Bell System, and were used for regulatory purposes. Most states contain several LATAs.

Local Exchange Carrier (LEC): Telephone company lingo for your local telephone company. See also RBOC.

Local Loop: This part of the telecommunications network connects end users to the central office network facilities. Twisted pairs of copper wire form the traditional medium of the local loop. Also known as the subscriber loop, local line and access line.

Narrowband: This medium is capable of carrying voice, fax, paging, and relatively slow-speed data (not full video applications), typically at 64 Kbps or less.

Network Element: As defined in the Telecommunications Act of 1996, a facility or equipment used to provide telecommunications service.

Packet: A series of bits containing data and control information, including source and destination node addresses, formatted for transmission from one node to another.

Packet Switching: A transmission protocol in which data is divided into small blocks so that different packets could travel over different routes to avoid overloading a single facility. Paths are temporary and dynamic.



Packet-Switched Network (PSN): A PSN network carries information broken into digital “packets” that are transmitted independently and then reassembled in the correct order at the destination.

Point of Presence (POP): In telephone service, the point where the inter-exchange carrier’s network begins and the local exchange carrier’s responsibility ends. Or, more broadly, the point at which traffic is transferred from one portion of a network (say, a long-haul trunk) to another.

Point-to-Point: A circuit connecting two nodes only, or a network requiring a separate physical connection between each pair of nodes.

Plain Old Telephone Service (POTS): This term often is used to refer to analog voice telephone services provided over the public switched telephone network.

Primary Inter-exchange Carrier (PIC): The PIC is the main long-distance carrier used for “1+dialing” through which all interstate long-distance toll calls are made.

Private Branch Exchange (PBX): A private switch used by large organizations to bypass the telephone companies’ central office switch, usually located on the customer’s premises.

Private Line Service: Dedicated telecommunications channels between two points or switched among multiple points. Privately leased for high-volume voice, data, audio or video transmissions.

Public Switched Telephone Network (PSTN): The PSTN is the worldwide circuit-switched telephone network. Once only an analog system, these networks are digital, though most subscribers are connected via analog circuits.

Regional Bell Operating Company (RBOC): RBOCs comprise the U.S. local carriers created in the 1982 Consent Decree to break up AT&T. Seven were formed to serve as parent companies for the 22 then-existing Bell Operating Companies. Today, the remaining RBOCs are BellSouth, Qwest, SBC and Verizon.

Resale: A method competitors can use to enter a market using the ILECs' network. CLECs resell telecommunications services purchased wholesale from another carrier.

Resale Carrier: A carrier that does not own transmission facilities, but obtains communications services from another carrier for resale to the public for profit. Also known as a Reseller.

Slamming: The switching of a customer's long distance service from one company to another without the customer's permission.

Special Access Service: A transmission path directly connecting an inter-exchange carrier location in a LATA to an end user premise or another inter-exchange carrier location.



Subscriber Line Charge (SLC): A monthly fee paid by telephone subscribers to compensate the local telephone company for part of the cost of maintaining the telephone equipment linking private homes to the telephone network. The SLC was originated at the same time as access charges to help support universal service.

Switched Circuit: A communications path that allows the originator to specify a desired destination for each call.

Switched Circuit Network (SCN): Synonym for the Public Switched Telephone Network.

Switched Network: Any network in which switches are used to direct messages from the sender to the ultimate recipient.

Switched Services: All dial-up long distance services.

Switching Fee: A per-line fee (usually around \$5) to reprogram the telephone switching system to change a customer's default carrier. Subscribers must usually pay this fee when switching to a reseller.

Switchless Reseller: A reseller of long-distance services that does not use any of its own facilities (lines or switching equipment).

T-1: A type of high-speed digital data connection that operates at 1.5 Mbps and requires a two-pair (four-wire) connection between the telephone company Central Office and the customer premises.

Tariff: A statement by a communications company that sets forth the services offered by that company, and the rates, terms and conditions for the use of those services.

Trunk: An analog or digital connection from a circuit switch that carries user media content and may carry telephony signaling.

Twisted Pair: A pair of wires used in transmission circuits and twisted about one another to minimize coupling with other circuits.

UMB: Ultra Mobile Broadband is a technology that provides speeds for mobile service up to 280 Mbps; it works with several different types of wireless service and is expected to help transition to 4G services.

UWB: Ultra Wide Band is a radio technology allotted spectrum in the 3.1–10.6 GHz range, most likely to be used for unlicensed short-range indoor applications such as wireless file transfers.

Unbundled Network Elements (UNE): The parts of incumbent local exchange (phone) companies' (ILECs) networks they must offer to other providers.

Wideband: Wideband is a synonym for broadband.

Wi-Fi: A wireless local area network that offers connections to the Internet or a virtual private network (VPN) within a small area using the IEEE's 802.11 "family" of wireless standards.

WiMax: A wireless broadband technology that can provide connectivity up to 30 miles using the IEEE's 802.16 standards. Also refers to the industry association that promotes this standard.



NOTES

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