Telecommunications Competition in a Consolidating Marketplace

A Report of the Sixteenth Annual Aspen Institute Conference on Telecommunications Policy

Robert M. Entman, Rapporteur

with

Opening the "Walled Airwave"

by Eli Noam

THE ASPEN INSTITUTE

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Charles M. Firestone
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Washington, DC
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Foreword

The Aspen Institute Telecommunications Policy Conference brings together leaders and experts from various sectors of the business, government, and nonprofit sectors to address specific regulatory or deregulatory policies in the provision of telecommunications in the United States. From this annual activity we hope to enhance the general understanding of these issues and generate new models, options, and recommendations of policies that would enhance the overall public interest.

This is the report of the 2001 Conference on Telecommunications Policy, which was held in Aspen, Colorado, in August 2001. It follows directly the work done in Aspen in the summer of 2000, when participants devised a "layered" approach to telecommunications. This proposal was a response to the problem wherein various "silos" of regulatory schemes for the regulation of telecommunications services appeared to compete with each other (e.g., wireline, wireless, cable, satellite, and broadcast). In the report of the 2000 conference, *Transition to an IP Environment* (available at www.aspeninst.org/c&s/pdfs/transition_bk.pdf), rapporteur Robert Entman set forth the outlines of this layered approach, and professor Michael Katz appended a paper on the implications of such an approach for telecommunications regulatory policy in the future. In 2001 we explored applications of that approach in addressing the movement to a truly competitive telecommunications marketplace in light of the new exigencies of the communications markets.

Accordingly, this year's report examines competition not only within but across "platforms"—that is, the separate forms of physical transport and networking of communications such as cable, wireline telephony, wireless, satellite, and the like. In so doing, the group took into account, among other things, the trends toward consolidation in these fields and what factors might increase or delay those trends, the burst bubble of investment in the telecommunications sector, and innovations in the uses of the electromagnetic spectrum that require a rethinking of our regulatory and allocation schemes for spectrum.

This report is a result of the combined thinking of experts who represent a variety of often conflicting interests. One of the best aspects of the Aspen conferences, however, is that participants are open to a true exchange of ideas; to innovation in thinking about the problems at hand; and to a just result, not just one of "fair advantage" to their interest. By this process we are able to identify areas of general agreement (without taking votes or expecting consensus) as well as those of greatest contention, and float some interesting new ideas. Nevertheless, the statements and opinions in this text are those of our perennial rapporteur, Professor Robert Entman,head of the communications department at North Carolina State University, and should not be attributed to any other participant,sponsor, or employer unless specifically stated in the text.

This report tackles difficult issues, such as how to encourage cross-platform competition without stifling investment,how to think about consolidation while encouraging intraplatform competition, and how to rationalize competing schemes of regulation within the federal jurisdiction and across federal, state, and local jurisdictions. We were fortunate to have among the participants the chairman and a commissioner of the Federal Communications Commission; key congressional staff; outstanding academic and consumer voices; and an array of competing business interests, from manufacturers to cable operators and from Bell operating companies to financial investment companies. We think Professor Entman did an outstanding job in weaving the discourse at the conference into an accessible and comprehensible discussion of the topic.

Clearly, however, the issues of spectrum policy have come to the fore and are worthy of considerable extra attention. At the conference, one of three working groups addressed spectrum policy. In view of the prominence of these issues going forward, we have included the report of the Wireless Working Group, also written by Professor Entman, as Appendix A. Considering that this Appendix is simply a working group report, completed in just a day and a half during the conference, the document is unusual in its extensive yet succinct treatment of the issues.

We have also included as Appendix B a short piece by Eli Noam, director of the Columbia Institute for Tele-Information and professor of finance and economics of the Columbia Business School at Columbia

University. Professor Noam's essay, "Opening the 'Walled Airwave,'" provides an innovative approach to spectrum regulation—namely, applying the separation requirement of *Carterfone* to wireless instruments. *Carterfone* required that wireline telephone companies allow customers to purchase their telephone instruments from third parties as long as they conformed to FCC standards. Noam suggests a similar approach to wireless. This issue was not adequately discussed at the conference and thus is not a significant topic in this report. We include Professor Noam's expanded piece in this volume to provide policymakers with some additional innovative thinking on the very timely topic of spectrum regulation.

Acknowledgments

I am pleased to acknowledge and thank our sponsors for their generous contributions to the success of this conference. The following competing companies sponsored the 2001 conference: AT&T, BellSouth, Cablevision Systems Corporation, Cingular, Comcast, Cox Enterprises, Credit Suisse First Boston, Intel, Legg Mason, Qwest, SBC Communications, Verizon, and Worldcom. For sixteen years, Robert Entman has provided an intelligible and comprehensive report of the conference, and we thank him again for that. We also want to acknowledge and thank Professor Eli Noam for publishing his innovative paper in this volume. Finally, we thank Patricia Katopol, program associate, and Sunny Sumter-Sana, senior program coordinator and publication production manager, for providing the behind-the-scenes work to bring this conference and report to fruition.

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Telecommunications Competition in a Consolidating Marketplace

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by Robert M. Entman

Introduction

The 16th Annual Aspen Institute Conference on Telecommunications Policy met in August 2001 to discuss "Transition to an Ideal Competitive World." A diverse group of experts representing state and federal government, corporations, and academic institutions deliberated over the nettlesome public policy issues arising from the evolving technologies and markets of telecommunications. The participants met in plenary and smaller working group sessions. The two dominant themes of the conference were competition and openness. Almost all participants regarded each of these goals as desirable for their ability to serve consumers from the largest businesses to the small rural household with innovative services at the lowest possible cost. Of course, emphasizing these overarching values in discussion is much easier than achieving them in practice.

Although a wide range of services was discussed, most attention centered on five particular services, and participants spent considerable time discussing whether and how "cross-platform competition"—that is, competition between different providers of separately owned physical transport and network facilities—could be brought to each service market. The major issues for the meeting coalesced around the following matters:

- Encouraging cross-platform competition without stifling incentives for investment;
- Striking the proper balance between industry consolidation and competition;
- Discouraging "walled gardens" by maximizing users' choices of applications or content; and
- Enhancing exploitation of the radio frequency spectrum, uses and demand for which have been growing explosively.

Cross-Platform Competition

The degree to which different "platforms"—wireless commercial mobile telephony, traditional wireline telephony, cable television systems, direct broadcasting systems, and perhaps others—will compete with each other to provide reasonably substitutable applications (services) received close attention at the conference. There was a consensus that—as Michael Katz, Arnold Professor of Business Administration at the University of California, Berkeley, and deputy assistant attorney general at the Anti-Trust Division of the U.S. Department of Justice, predicted—we will not see a great many competitors in most telecommunication markets. It may not take a lot of competitors, however, to reap key advantages of competition in the form of innovation and price discipline.

For the purposes of the conference, competition was defined as a condition in which firms are constrained in their pricing power and stimulated to innovate by existing and potential market-disrupting competitors. The services of particular interest include residential voice telephony; residential broadband data (Internet) access; video programming; mobile voice telephony; and mobile narrowband data (Internet) access. The animating questions were whether these markets would have at least two or, better, three separately owned, fully competitive platforms, and what public policy might do to encourage this outcome. With regard to competition within platforms, only one market now meets the test: Commercial mobile radio service (CMRS), popularly known as cellular phone service. Participants agreed that the current number of cellular players in most urban markets—six or even more—is highly desirable but probably not sustainable in the long term. The following table captures the dominant expectations of conference participants. Achieving the fullest possible potential for competition was the core subject of conference deliberations.

TABLE 1

Application	Potential Competitive Platforms
Residential voice telephony	• Incumbent local exchange companies (ILECs) • Commercial mobile radio service (CMRS—mostly cellular) • Cable television system telephony
Residential broadband data (e.g.,Internet access)	• ILECs (digital subscriber line, DSL) • Cable television systems (cable modem) • Direct broadcast satellite (niche only)
Video programming Mobile voice telephony	• Cable television systems • Direct broadcast satellite
Mobile narrowband data (e.g.,internet access)	• Broadcasting stations • CMRS—intraplatform competition only • CMRS—intraplatform competition only

As the table suggests, participants expect that most residential consumers will have the choice of three platforms offering voice telephony and two providing broadband local access, via cable modem and digital subscriber line (DSL) service. Broadband access via direct broadcast satellite (DBS) or wireless will pose little if any competition for cable and DSL broadband. Cable television operators in many localities should be able to provide strong competition in voice telephony. A third wireline network could also be built in some high-density areas, but mostly to serve businesses. Such a network faces natural entry barriers resulting from economies of scale and density, as well as artificial barriers relating to local policies on granting of rights of way. Wireless will offer genuine competition to wireline voice telephony service in many areas. DBS is a nearly ubiquitous competitor to cable television (as is traditional broadcasting) for video program supply. The degree to which DBS or broadcast imposes price discipline on cable is in some dispute, however.

Competition vs. Other Values

Gene Kimmelman, co-director of the Consumers Union, discussed the limitations on competition,especially for voice telephony, that reside in the culture and politics of the telecommunication industry and policy process. He noted that the United States has developed an expectation that differs from that of the rest of world with regard to pricing local phone service: Inexpensive basic service appears to be far more important to Americans than having a choice of suppliers. "People want cheap prices for low elasticity of demand goods," said Kimmelman, "and they're not that aware of the need for prices to go up to get innovation. Within that constraint, they want choice and reliability."

In addition, the political system grants considerable voice to organized interests, and by most accounts the overhaul of the telecommunications policy arena embodied in the 1996 Telecommunications Act was influenced as much by the balance of political forces as by objective policy analysis (the regional Bell operating companies [RBOCs] appeared to have more votes than the long-distance companies). When politicians become involved, policy designed to strengthen competition is constrained by political realities, Kimmelman argued.

On the other hand, at least in the view of some participants, competition is seriously threatening to breakout. Alex Netchvolodoff, vice president of public policy for Cox Communications, described Cox's telephony offerings. He said that Cox provides phone service at a 10 percent discount over the ILEC for the first line (50 percent off for a second line), and does so with a 40 percent profit margin and with service as reliable as that offered by the Bell companies. In fact, said Netchvolodoff, some Bell companies are seeking permission to lower their rates to meet the competition from Cox, which is winning as much as 30 percent of customers in some locations. These figures met with incredulity on the part of some participants, but Netchvolodoff insisted that by leveraging the network that has already been built to deliver video and broadband, as well as sufficient penetration, Cox generates positive cash flow from this pricing structure. In other words, it is possible to offer telephony at a price lower than that charged by the ILECs, even though the latter have long maintained that regulation holds their prices below costs.

Robert Pepper, chief of the Federal Communications Commission's (FCC) Office of Plans and Policy, elaborated, using FCC statistics. He

said that the average cost to deliver the ILECs' local service is $23 per month, and the average rate is $19 per month. The average local bill amounts to $33, however, because so many households take vertical services such as call waiting and caller I.D. According to Pepper, these figures mean that even though the average regulated price for local telephony is below average cost, the typical household generates net revenue for ILECS because the vertical services are so profitable.

Pepper even suggested that cell phone service can substitute in some markets for traditional plain old telephone service (POTS). He argued that the large buckets of off-peak minutes that typically are available even on low-cost monthly service packages mean that, practically speaking, consumers can save money by paying $30–$40 per month for a feature-rich cell package that they use mostly at night and on weekends for local and long-distance calling. Certainly this service is creating downward pressure on long-distance revenue. Rural America may not enjoy the benefits of such competition. Interestingly enough, however, many participants voiced even more optimism for vigorous competition in the market for voice telephony than for markets previously expected to be competitive in this respect, such as video programming and broadband.

With regard to these markets, most participants predicted that only niche competition would emerge, and perhaps not even that. For example, Kevin Kahn, Intel Fellow and director of communications architecture for Intel, suggested that DBS can serve people who seek broadband but are beyond the practical reach of DSL (currently about 18,000 feet from a telephone exchange's central office); this fact does not affect the DSL supplier's price in its key markets, where the slower DBS service is far inferior to readily available cable modem and DSL choices.

In practice,then—as Robert Quinn, AT&T's vice president for federal government affairs, remarked—most consumers will see two platforms for broadband and video programming: the cable operator and the wireline telephone company. The issue is whether two platforms are enough to reach the goal of a deregulated, competitive market. Gerald Faulhaber, former chief economist at the FCC and now professor of business and public policy at the Wharton School of Business at the University of Pennsylvania, agreed that the likely market structure "will not look like economists' ideal of competition." Platforms, he said, are capital intensive and sticky, which means that when companies come up

with new ideas that might add value,they will try to capture benefits by locking customers into their platforms—promoting further stickiness. Without some stickiness, and thus pricing power, incentives for innovation decline rapidly. As in the pharmaceutical industry, said Faulhaber, consumers will need to put up with prices above costs if they want to see innovation. Kimmelman—echoed by Colin Crowell, legislative assistant to Representative Edward J. Markey (D-Mass.)—argued that many citizens are uncomfortable being told they must pay higher rates for telecommunications services on the promise of vaguely articulated future benefits emerging from a market in which only two platforms compete.

Thus, participants at the conference spanned a continuum. One end is acceptance of imperfect market competition yielding somewhat higher prices (than in a perfectly competitive market) in exchange for continued investment and innovation. The policy question then becomes, in Faulhaber's words, "When are we going to know that we can stop regulation? We need to develop an exit strategy for regulation." On the other end of the spectrum is real concern about the possibility of high prices yielding little in the way of direct benefits to ordinary residential consumers, and thus rejection of the idea of an early exit for regulation. In Kimmelman's view, for instance, continued careful regulatory intervention can help strike a balance between innovation and efficiency on one hand and social goals on the other.

Conflicting Demands

Dan Reingold, managing director and global telecommunications research coordinator at Credit Suisse First Boston Corporation, opined that consumers actually seem to reject the need to balance objectives and want several incompatible things at once: low prices, rapid innovation, wide choice among competitors, and reliable service. Maureen McLaughlin, senior minority counsel for the U.S. Senate Committee on Commerce, said succinctly, "People want cheap and they want choice,and that's a fundamental tension we must deal with." FCC Chairman Michael Powell added to the portrait of demanding consumers by reporting that the impatience and unrealistic demands of many Americans poses a real problem for the Commission. "We can't raise phone bills five cents without my head being taken off—even though the phone bill is a great value relative to other utilities, including cable." Powell's office is bombarded

with complaints about the purportedly slow pace of broadband deployment, the imperfection of cellular phone calls, and the like. Consumers often seem to demand perfect quality and reliability, even from innovative technologies such as digital cellular, and they want it instantly. Some participants blamed overhyping of the 1996 Telecommunications Act for raising unrealistic expectations. Powell urged that political leaders counsel their constituents to have more patience.

On the other hand, Donna Sorgi, vice president for federal advocacy at WorldCom, endorsed a degree of impatience—what she called "targeted impatience"—at least among regulators. Sorgi said government officials should feel some urgency to spur competition where monopolistic tendencies otherwise might persist or take root. "We in the private sector cannot drive competition without some help from an impatient government," she said. Bob Rowe, commissioner of the Montana Public Service Commission and past president of the National Association of Regulatory Utility Commissioners (NARUC), suggested that some impatience among consumers is also a good thing. Rowe urged consumers to express their demands in terms of the services they need rather than in terms of particular technologies they have heard about. Channeling consumer impatience for new services into the market can stimulate market entry and supply by a range of providers. Powell observed that what is needed is responsible leadership from officials who can help to guide the public's expectations in realistic directions.

Chairman Powell described some of the difficulties surrounding policy choices that attempt to weigh all of these objectives and incompatible pressures. For one thing, he said, officials are "playing chess on a three-dimensional board," trying to define markets whose participants and offerings are constantly shifting. Telecommunications poses a unique challenge to policymakers, who are at their best dealing with a mature and stable system such as the monopoly telephone system of old. Making matters worse, Powell finds that data for decisions and judgments are often not readily available. One of his goals at the Commission is to create a foundation for better debates on rules so that decisions rest on solid empirical data. As it is, Powell said, the commissioners find themselves deliberating on issues such as ownership restrictions, caught in a political crossfire of competing, visceral assumptions and fears rather than having strong evidence for any one position. Government must be vigilant in collecting data that can make for more informed decisions, Powell said.

Policy Options

What, then,are some realistic policies for stimulating cross-platform competition and innovative investment, without creating a strong political backlash or allowing unreasonably high prices for key services? Conference participants explored the following principles:

- *Limited retail rate regulation.* The Working Group observed that retail rate regulation does not itself promote competition, and rate regulation may even stifle or distort competition. The current compromise of keeping caps on the prices of two traditionally low-cost services—POTS and basic cable television service—seem desirable to deal with problems of market power and as a matter of political realism. Beyond this,however, retail price regulation should not be extended to the other services.
- *Promoting efficient entry.* In addition to promoting strong competition among incumbents, public policy should encourage entry by new providers, but only where it is efficient. This view leads to three further principles:

  1) *Public policy should not create artificial barriers to entry, nor should it allow incumbents to do so.* The overly restrictive rights-of-way policies pursued by some municipalities are models of what government ought not do. Policies that restrict the abilities of service providers in one area to expand into provision of other services are another way to create artificial barriers without yielding significant benefits. At the same time, policy should encourage interconnection and thereby help to prevent construction of artificial entry barriers by incumbents.

  2) *Public policy should be sensitive to economic facts of life.* Entry is not always efficient. For example, some providers may be less efficient than others, or demand and cost conditions may be such that a market simply will not support a large number of providers. In the ideal, most participants agreed, more competition yields more benefits. Physical limits, however, will constrain the number of platform suppliers. The laws of physics, for instance, dictate limits

on the numbers of signals that can be transported efficiently via the spectrum. Among other implications, therefore, wireless may never be a substantial competitor to wireline and fiber. The physical constraints vary, however, depending on the specific frequency and uses, and can change with new technology.

Consolidation and Investment

Blair Levin, managing director and telecommunication and media analyst for Legg Mason, outlined what for many conference participants was a troubling scenario featuring a rapid consolidation of the industry. Even if public policy does try to maintain or enhance the level of cross-platform competition, Levin suggested, the investment community and other forces seem to be promoting more concentrated markets. Two of Levin's predictions are of particular concern here—one about the residential voice telephony market and the other about CMRS.

Consolidation of Local and Long-Distance Telephone Companies

First, Levin argued, the regional Bell operating companies (RBOCs)—which own the major incumbent local exchange carriers and now number just four (down from the original seven)—are likely to merge with or acquire the three major interexchange carriers (IXCs): AT&T's long-distance unit, Worldcom, and Sprint's IXC division. This consolidation will be driven by the RBOCs' satisfaction of requirements in Section 271 of the 1996 Telecommunication Act, enabling them to add inter-LATA (local access and transport area) long distance to their current local calling service. According to Dan Reingold of Credit Suisse First Boston, "Wall Street has written off the long-distance industry" as freestanding entities.

Thus, Levin said, the main question is not whether but when consolidation between RBOCs and IXCs will occur: "Will the mergers occur soon, before IXCs are hurt by RBOC competition [as they enter long distance in force], or will they occur only later, when the IXCs will be worth very little?" Articles in the October 1, 2001, *Wall Street Journal* suggest that the answer is sooner—as of September 2001, AT&T had talked with all four RBOCs about selling its IXC[1]—and the terrorist attacks of

September 11 only accelerated the momentum behind consolidation.[2] The next question is whether there will be further consolidation among the four RBOCs: SBC (formerly Southwestern Bell and Ameritech), Verizon (formerly Nynex, Bell Atlantic, and GTE), BellSouth, and Quest (formerly US West and the smaller, newer IXC, Quest). One of the concerns raised by the shrinkage from what had been 11 independent and at least potentially competitive entities (the seven RBOCs plus four IXCs) to no more than four RBOCs, three of which own major long-distance carriers, is that it would give control of four of the top five Internet backbones to the RBOCs. The bigger concern is that such consolidation essentially portends a return to the pre-AT&T divestiture days, with four regional versions of the old Ma Bell in place of the old monolith.

Some conference participants suggested that it is not beyond the realm of possibility that these four would themselves fuse into two or three, meaning the vast majority of customers for traditional landline telephone service would be served by one of two or three firms. Participants saw no particular reason to expect these firms to compete against each other, at least for residential customers; instead they envisioned each one serving only customers within its (greatly expanded) region of the United States. Most participants believed that large business customers will attract the attention of the two or three integrated phone companies left after the consolidation, and that this situation would constitute a degree of real intra-platform competition in the business market. The same cannot be said, however, of residential customers, whose hope for competition in voice telephony would have to rest on the availability of other platforms—most likely cable TV systems and cellular.

In Reingold's view, the Bush administration "won't waste its time" trying to encourage Bell versus Bell competition out of region and thus will not hold up the looming mergers. The merged companies will have somewhat more pricing power in their regions than they currently do;the question is whether this power will be balanced by more general benefits arising from the stronger financial positions of the merged entities. Implicitly, by letting the mergers occur, the government would be answering this question in the affirmative. FCC Commissioner Kevin Martin voiced support for the possibility that allowing vertical consolidation to occur will strengthen the likelihood of horizontal (that is, out-of-region) competition among more massive, vertically integrated RBOCs seeking new market opportunities.

Two dissents to this optimistic view arose. Gene Kimmelman of Consumers Union suggested that beyond a tier of early-adopting consumers, whom the post-divestiture telecommunications market serves well, is a much larger group—perhaps half of all households. These households average 1,200–1,400 minutes of local calling and 50–60 minutes of long distance per month. Reingold and Levin predicted that out-of-region competition would occur only for large customers and that it certainly would not do much to help the bottom 50 percent of households.

Kevin Kahn of Intel argued that aside from pricing, we should be worrying about the mergers' effect on innovation in applications and content. Independent of prices and costs for consumers, said Kahn, it would be undesirable if a consolidated firm restricts innovations by limiting what is deployable on its platform. The Internet model teaches that those outside the network provide many innovations, and Kahn saw a real danger that the large vertically and horizontally integrated firms envisioned by Levin and Reingold will attempt to control applications and content on their facilities.

Wireless Mobile

A second kind of consolidation covered in Levin's analysis was among CMRS firms—that is, among the six or so companies that now offer cellular phone service in most parts of the country, as well as between them and smaller regional operators. Levin's analysis suggests that the RBOC-IXC combinations will have incentives and capacity to acquire—or in some cases expand holdings of—cell phone firms. For example, Verizon, which operates the dominant ILEC serving customers from Maine to Virginia, also operates a nationwide cellular service and might have strategic reasons to link up with Sprint, which owns a thriving nationwide cellular operation along with its IXC. If a combination such as that occurred,it might spur further consolidation. As one example among a range of possibilities, because BellSouth and SBC together own Cingular Wireless, a Verizon-Sprint merger could impel them to consider merger.

The combination of wireless providers with each other or with RBOCs concerned some participants. Those in attendance agreed almost unanimously that the wireless market is one place that government policy has

succeeded: Most metropolitan areas now enjoy multiple, vigorously competing CMRS firms. (Technology and economics also contribute to the success of wireless competition.) Many participants blanched at prospects that consolidation could yield a regionally dominant landline phone company owning one wireless mobile provider competing from a position of great strength with one or two other CMRS firms—albeit themselves consolidated—in most markets. Not only competitive pricing but also innovation could be in jeopardy. The key concern is that a consolidated wireless market could derail any potential for disruptive competition—that is, competition offering the possibility of realigning the market and its players. An example would be the (still speculative) potential of wireless to serve eventually as a competitive "third broadband pipe" into the home, alongside cable television and ILEC wires. A market of just two or three nationwide CMRS firms, all affiliated with RBOCs, could generate few incentives for such disruption.

Spectrum Policy and Consolidation

A policy change will be necessary, however, before consolidation can get very far; that change involves lifting or limiting the current cap on the amount of spectrum each cellular provider can own (40 MHz per market). There appears to be substantial sentiment for raising or even eliminating the ceiling, in large part to allow companies to meet growing demand. If spectrum caps remain in place,mergers cannot occur in the absence of special waivers. Assuming, however, that action on spectrum policy does enable mergers, policymakers will face new questions, as Levin pointed out: What metric should government use in analyzing the mergers? Is the key number the amount of spectrum controlled by one entity or the size of customer base the merged firm would "control"? Would a merger be highly undesirable if it leads to RBOC control of one or more major wireless firms? Is there some way to open more spectrum to auctions to create entirely new players? The goal would be to maintain the potential for disruptive competition but not to create so much competition that investment capital will become scarce.

Beyond the physical limits to spectrum availability, there are political and legal constraints that limit officials' ability to reallocate spectrum

from current licensees. There are also physical limits to the propagation and carrying potential of signals at many frequency bands that may be available. Nevertheless, enhancing management of the spectrum offers a way to make more spectrum available for commercial use. FCC Chairman Michael Powell took a strong stand on this matter, suggesting that "bold change is preferable to incremental.... The problem will keep returning unless we fix it fundamentally." Powell suggested that government policy might place far heavier reliance than it now does on the market to allocate the scarce resource of spectrum. Among the specific steps would be allowing spectrum holders more flexibility in the specific uses to which they put their allocations and encouraging more active secondary markets in spectrum. These policies should create improved mechanisms to get spectrum to its best,most valued uses. (A more complete consideration of these issues appears as Appendix A, "Report of the Wireless Working Group.")

A related option that generated considerable discussion was to further develop entirely unlicensed spectrum. Dale Hatfield, director of the interdisciplinary telecommunications program at the University of Colorado, highlighted the spectrum available under Section 802.11(b) authority—unlicensed frequencies that offer potential for innovation without any government involvement. For example, 802.11(b) spectrum can provide high-speed connectivity to laptop computers. Starbucks already is putting equipment to offer this service in some of its locations. Other places where people who might need high-speed mobile access include airports and universities. Neighborhoods might also find deployment of 802.11(b) networks. Of course, these "hotspots" will still need a physical connection to a broadband backbone, but the principle seems to be promising. Indeed, it may be so promising that, in Kevin Kahn's view, we could run into limits on total capacity (currently 5 GHz). Moreover, as utilization of 802.11(b) spectrum grows, the need for international harmonization of standards also will arise.

Layers and Opening the Walled Garden

Separating the telecommunications network into four "layers" for the purpose of analysis has proved valuable in thinking through appropriate policy responses to continuing major changes in communication technology and markets. From the previous year's work,[3] the Aspen Institute Telecommunications Policy Conference has employed a fourfold classification:

1) *Data link layer*—the physical transport of communication signals via copper wire, coaxial cable and fiber networks, and radio-magnetic spectrum. Economies of scale are most likely to exist at this physical layer, although their magnitude depends on public policy toward spectrum allocation, access to rights of way, and the like.
2) *Network protocol and switching layer*—the system that allows signals, typically digitized packets, to be routed and switched through networks from point of origin to destination.
3) *Application layer*—the layer that determines the nature of the signals being transported and routed (typically voice, video, or data).
4) *Content*—the specific information being transmitted, such as a telephone conversation or video entertainment program.

One of the key lessons of this conceptual exercise is that different layers may experience different levels of competition. If economies of scale are most likely to characterize the physical transport layer, the policy implication is that special procompetitive efforts and perhaps regulation may be needed at that level but not necessarily at others. In many instances, the content and applications layers clearly can support more than two providers, even if the network layer and especially the transport layer are not competitive—raising the question of whether the concentrated nature of the network and data link layers could inhibit competition at higher layers. By the same token, vertically integrated firms might have the incentives and ability to reduce competition at multiple layers of the system.

We must realize, however, that although the four layers are separable in theory, they may not be so distinct in practice. For some specific

business plans and technologies,disentangling data transport from network protocol, for instance, may be impractical. Moreover, the conceptual separation into four different layers should not be taken to imply that products in each layer are readily and completely substitutable for each other. There are also differences among different platforms (e.g., landline telephone networks, cable television systems). Each platform experiences different levels of governmental involvement at different layers, and each "breaks" between layers at somewhat different points. Generally, there is a high degree of stickiness and vertical integration within each of the platforms analyzed in this report.

Policy Implications of Layered Approach

Conference participants generally favored having more competitors rather than fewer, on the assumption that competition yields benefits such as innovation and lower prices. That point of agreement led to one of the questions that animated the most discussion at the conference: Should policymakers seek separation of the layers—that is, attempt to minimize vertical integration of firms or bundling of service across two or more layers (e.g., bundling of content, application, and network protocol)—as a way of protecting competition, or will market forces naturally bring about the optimal separation of and competition within the layers?

This question was explored most thoroughly in the context of cellular phone service. The main characteristic of the wireless business is that the customer is a contractual subscriber who is served horizontally by a wireless carrier that provides a full bundle of service, including determining the carrier that will provide long-distance service and deciding what software functions will be available on the handset. From the consumer's perspective, then, this arrangement represents a high degree of compulsory bundling; to choose a carrier generally is to choose everything as determined by that carrier. This bundling creates issues analogous to those experienced by consumers of fixed-line telephony and cable television.

Robert Pepper of the FCC argued that regulation actually can reduce the ability of market players to unbundle and introduce competition to a new layer. In today's cellular phone world, the telephone handset embeds only the applications determined by the carrier. This bundling appears to arise in part from regulations designed to protect the radio

frequency (RF) layer from interference or other disruptions that might be created by users employing outside applications. The rules may be preventing even cell phone providers who favor openness from making their handsets operable with third-party applications. Yet it is technologically feasible—indeed simple—for applications (i.e., software) that are designed for one cellular licensee to work on another's system. Although existing RF protection regulations are well intentioned, their effect is to reduce competition at the application level. Conference participants repeatedly analogized to the Internet, which is almost completely open to whatever applications a user cares to make available or to use. In a similar way, users can choose to employ only the software that is preloaded on their Palm Pilots, but they also are free to download thousands of third-party applications. The openness to others' software has made Palm Pilots far more valuable to their users, stimulating further demand for the hardware.

Most participants felt that this model should apply to cell phone handsets, believing that the distinction between the RF layer and network layers on one hand and the application layer on the other is worth protecting in policy. In other words, they felt that public policy, rather than preventing cell service providers from allowing their subscribers to download third-party applications to their handsets, should encourage such openness. If the Internet and Palm experiences are any indication, this approach should lead to an explosion in demand for the products and a robust, highly competitive market in applications.

This is where the "walled garden" metaphor arose. Pepper pointed out that almost all Internet service providers (ISPs) offer bundled applications and the ability to download others from anywhere on the internet. This strategy is not required by public policy, however, and Kevin Kahn observed that some service providers restrict access, in various ways favoring certain application providers (e.g.,news websites or game sites) in return for sponsor payments or other incentives. Such limitations seem to be common with regard to Internet service via cell phones, and they have the effect of making subscribers "harvest from within a walled garden" that is limited to partners of the cell supplier. If the cell phone handset becomes a ubiquitous mobile information device, as many people suspect it will, such restrictions on functionality could be costly for society.

As handsets become smarter and networks begin to offer increasingly higher-level services, the issues of who may load what applications onto a handset and what network-based service interfaces these applications may access becomes more important. Are users restricted to the applications offered by the primary service provider, or may they load other applications? Furthermore,can these applications have full access to the functions of the network and the handset?

Suppose a brokerage wants to offer a handset application that uses the screen and alerting (sound or vibration) capabilities of a handset to provide a service to its client. Does deployment of such an application require the cooperation of the wireless service provider? In today's Internet, deployment of such an application on a personal computer would not require any support from the ISP. Will this be analogously true for wireless?

As a second example, suppose a company wishes to deploy a universal messaging application that can alert users to any messages,e-mail or voice, that they have on any of a number of message queuing services. This application requires access to the alerting indicators of the handset, and it may require access to the voicemail service so that messages queued there can be included in the new service. Does the provider's handset software allow such an application?

As a final example, suppose a vending machine with an infrared or Bluetooth interface can interact with a handset to communicate with a back-end billing service to handle the vending. This interaction requires a digital certificate sent from the machine through the handset to the back-end service, followed by an authorization sent back via the same path to the machine. Again, this process requires the application to have access to specific functions of the handset (probably an infrared port, the screen to present selections, and the buttons to select). Can this application be deployed without the cooperation of the wireless service provider?

Dale Hatfield of the Interdisciplinary Telecommunications Program at the University of Colorado noted that in such cases, maintaining the separation between the handset/application layer and the network layer would be the key to maintaining openness. An ideal goal would be to treat the handset as a universal wireless terminal that can access other wireless carriers, wireless local area networks (LANs), and any Internet portal. Government rules for equipment, Hatfield argued, should not

require artificial integration of the four layers; nor should carriers be permitted to reject handsets sold by others, assuming they do no harm to the network.

This point stimulated debate on whether the market will respond to customer demand for openness or whether public policy would have to intervene to require openness. On one hand, one might assume that if enough customers want to use applications and visit Internet sites without restriction on their handsets, one or more service providers would make that option available. Gerald Faulhaber of the Wharton School noted that the market seems to spread popular innovations; he pointed to how the "first incoming minute free" policy of one cellular carrier was rapidly copied by others in response to consumer demand.

On the other hand, this expectation presumes a certain level of competition that is by no means guaranteed if the aforementioned consolidation in the industry occurs. Colin Crowell, legislative assistant to U.S. Representative Edward Markey (D-Mass.), pointed to the interdependence of this issue and that of industry consolidation—in particular, relaxation of current limits on the amount of spectrum a single wireless carrier can license. If markets wind up with only two or three competitors, carriers may have sufficient economic power to restrict access to the "walled garden" they themselves construct. Robert Pepper pointed out, however, that even in markets with limited competition, such as cable television, openness to a variety of applications (here, TV programming services) can maximize providers' revenue. Although cable TV systems initially tended to discriminate against unaffiliated premium movie channels, they soon decided that they would make more money (assuming sufficient channel capacity) by offering as many premium choices as possible.

Another aspect of the issue arises from network effects. Kevin Kahn suggested that there is a difference between features that can be directly marketed to consumers to make offerings more attractive (such as the free incoming minute), and features for which the benefit builds on longer-term network effects. One example (available in other countries) is the ability to use a cell phone to make purchases from a vending machine. This capability requires not only a new application on the handset but also new hardware and software installed in vending machines. If only one of the six wireless providers offers the vending machine feature, it may not pay vending operators to modify their

machines; if few vending machines are compatible with the handset application, few consumers will regard the capability as a significant reason to patronize a particular cell service, which will further diminish the incentives for vending machine operators to invest in the new hardware and software. This example suggests that if benefits to consumers are one step removed—if they require actions by others—the market alone may not provide much incentive for openness to new applications.

Conference participants also considered the closely related matter of handset interoperability. Users frequently may desire—particularly if they are roaming—to manually select the carrier they use on the basis of pricing or service differences. There was some factual dispute over whether a handset purchased in conjunction with, say, Sprint PCS could be used with another cellular provider that employs the same technology (i.e., CDMA) and spectrum. Some participants asserted that pressing a few buttons would program the handset to work with a different provider. Others maintained that such programming is beyond the capacity of all but the most sophisticated users and in any case that one would have to make prior arrangements to open an account with the second provider. In practice, then, most cell phone owners are tethered to one carrier unless they actually purchase two separate phones and accounts.

Eli Noam, professor of finance and economics at Columbia University and director of the Columbia Institute for Tele-Information, suggested that policy can promote consumer choice without harming the network or RF layer. A carrier might be allowed to market its preferred equipment but prohibited from excluding other equipment, as long as it conforms to certain technical specifications pertaining to the RF transceiving function (physical transport) and network protocol layer (e.g., CDMA, GSM, etc). Thus, the handset might include other network protocols that are needed to access competitive wireless carriers. The carrier would be allowed to offer a fully bundled service as before but could not prevent a user from selecting, for any given call, another wireless service provider. Noam suggested that this policy would stimulate innovative features and,more important, permit a user to select service providers depending on circumstances. For example, users in a shopping mall, campus, office building, or airport could connect to a wireless LAN of their choice; if they encounter a circuit busy signal, they could switch to another carrier; and if they seek to receive

synchronous music, radio style, they could do so by accessing a specialized broadcaster that is unaffiliated with the wireless carrier. Noam argued that this choice would reduce the need for most other access requirements because the user would not be tied to a single carrier, with significant costs of switching to another. Although several participants said that policy should promote easy switching from carrier to carrier using a single handset, the practicalities of such a policy were not examined in detail during the conference. A more thorough exploration of Noam's thinking on policy treatment of CMRS providers appears in Appendix B to this report.

For some participants, however, the idea of opening "walled gardens" to all comers threatens to get out of hand. Joaquin Carbonell III, senior vice president and general counsel of Cingular Wireless, asked whether, by the same token, ILECs would have to open their networks to any application provider. The principle of openness has a long and controversial history on the landline side of the industry for cable television systems and ILECs, and any suggestion of unbundling applications from networks to allow open entry of, for example, video program providers on cable and competitive local exchange carriers (CLECs) in telephone will continue to provoke vigorous opposition.

Harmonizing Jurisdictions

Despite many conference participants' fond hopes, government will remain a potent force in shaping telecommunications markets for the foreseeable future. Streamlining the regulatory process and minimizing the negative impacts of government require, among other things, an effort to bring more harmony and cooperation to the three levels of government that have some say in the market. According to conference participants, a renewed commitment to this goal characterizes many officials at the federal,state, and local jurisdictions.

FCC Chairman Michael Powell suggested that the 1996 Telecommunications Act, whatever its flaws, does compel cooperation. No jurisdiction by itself can adequately achieve the aspirations of the Act. For example, maintaining and updating universal service requires harmonizing regulation across the three levels; more generally, to have any positive effect, enforcement actions must be consistent across the jurisdictions. Because many ultimate objectives of telecommunications policy are the same across jurisdictional lines, it should be

feasible to make decisions more quickly, with more uniformly positive effect for consumers. Between state and federal jurisdictions, there are already many examples of ongoing, substantive exchanges of views and data at the staff and principal level. These efforts include a variety of joint boards, the process of implementing Section 271 of the 1996 Telecommunications Act, the State/National Action Plan (SNAP) for Consumers, and the SNAP slamming/cramming database project. These initiatives provide plenty of precedent for future cooperation.

Bob Rowe, NARUC's past president, agreed with Chairman Powell's optimism about state-federal cooperation. Rowe described the pre-1996 Act telecommunications world as one of "duel federalism" in which states and the FCC had largely separate areas of authority, with the lines drawn in the pages of complex accounting requirements, and interactions tended to be very specific. In 1996, Congress could have adopted a preemptive federalist stance in which all decision making was driven at the national level. Instead, Congress opted for a "cooperative federalist" model in which the FCC and state regulators are given many specific responsibilities and are required to work together to carry out Congress' intent. Cooperative federalism could also be contrasted with European subsidiarity, in which decisions are to be made at the lowest possible level—which in an idealized form may be similar to the original American Articles of Confederation. Rowe has long advocated a general framework for federal-state cooperation that is designed to build on the strength of each partner, with a series of approaches that can be employed in particular situations.

Powell suggested that achieving harmony between the federal and local jurisdictions might prove more difficult than achieving harmony between the federal and state levels. Local governments, of course, are far more numerous and more diverse, even parochial, in their interests and outlooks. The federal desire to promote vigorous competitive entry clashes with some localities' interests with regard to issues such as rights of way, building access, and siting of cellular phone towers. David Svanda, commissioner of the Michigan Public Service Commission, pointed out, however, that localities are legal creatures of state governments, which means that states have authority to devise mechanisms that encourage more coherence between local rules and state and federal goals. In addition, Bob Rowe pointed out that an increasing number of local governments themselves are promoting competition in ways

that parallel federal goals. Some localities, Rowe said, are undertaking innovative and market-friendly strategies to increase deployment of advanced facilities by the private sector and access to advanced services by citizens. Rowe argued that although there are certainly local barriers, "there are also tremendous opportunities for innovative approaches by local governments, the governments closest to the citizens."

Conclusion

Although conference participants were united in their endorsement of competition and openness as principles, they did not agree on many specific policy recommendations. This lack of consensus on details did not arise because the group was unusually disputatious. Instead, it was a result of the growing complexity of the issues. Tensions between competition, economic efficiency, and economic concentration were not so visible in the past, when the degree of competition and variety of new services in the marketplace we now enjoy was more speculative. The United States has now accumulated five years of experience with the 1996 Telecommunications Act and related policies. Consider what has happened over the past five years,in part as a result of the Act and in part as a consequence of related policy decisions at all three levels of government:

- The success of spectrum policy and other decisions in generating a robustly competitive cell phone industry;
- Cross-platform and interplatform competition driving down long-distance prices to near parity with local calling, threatening the very survival of the multiple independent IXCs whose existence was a chief motivator of the epochal AT&T divestiture;
- Emergence of DBS as a nationwide competitor to cable, encouraging the latter to speed up its deployment of digital video entertainment and information programming on hundreds of channels; and
- Rapid diffusion of broadband Internet access technologies to the home, with cable television and ILECs vigorously competing to sell their services to a massive residential customer base.

From the perspective of these eventful five years, it becomes less surprising that unforeseen (or at least not widely foreseen) developments now

require some rethinking of existing policy paradigms. In particular, the 2001 telecommunications policy conference suggests that antitrust policy may become the arena in which many of the most important policy choices are made. If one were to draw a single general conclusion from the wide-ranging discussion at the conference it would be this: Maintaining competition in the face of market forces and Wall Street pressures that encourage consolidation seems to be critical to reaping the full benefits intended by the many officials who, over the past two decades, have embraced the idea that competition trumps regulation as a means of stimulating economic efficiency, innovation, and low prices.

Notes

1. Shawn Young, "AT&T's Plan to Sell Long Distance Units to the Baby Bells Won't Be a Simple Deal." AT&T at this date was also seeking to sell its cable television and broadband operations.

2. Michael Rieke,"BANDWIDTH BEAT: Market Action Seen Spurring Consolidation."

3. Robert M. Entman, *Transition to an IP Environment: A Report of the Fifteenth Annual Aspen Institute Telecommunications Policy Conference* (Washington, D.C.: Aspen Institute,2001).

APPENDIX

Report of the Wireless Working Group

Our major question was the following: Will wireless compete? The group identified four markets of interest: residential voice telephony; narrowband data (<144 Kbs); broadband data (equivalent to digital subscriber line [DSL] or cable modem); and multichannel video programming (equivalent to cable television). In these markets, wireless service is likely to provide competition for residential users within five years. The working group's overarching goal is public policy that enables wireless suppliers to enter these markets and compete successfully, wherever that entry would be economic. Note that most of the following analyses and proposals were not discussed in detail by other conference participants.

Competition from Wireless Providers

The working group first identified potential competitive wireless participants in each of these four markets, defining "competitor" as a participant in a market that can constrain the prices and quality of other suppliers' offerings in that market.

Potential Wireless Competitors in Voice Telephony

- Commercial mobile radio service (CMRS), consisting of cellular, personal communications service (PCS), and specialized mobile radio (SMR).

Potential Wireless Competitors in Narrowband Data (<144 Kbps)

- 2.5G–3G.
- Wireless local area networks (LANs); unlicensed "hotspots" in some specific places such as airports, Starbucks; "Mesh networks";hackers' ad hoc networks (likely limited to "nerd niche" but could expand into commercial market).
- Peer-to peer-unlicensed PCS.

Potential Wireless Competitors in Broadband Data

- MMDS/ITFS—the 2500mhz band—mostly fill-in and low-density areas;
- LMDS—mostly fill-in and low density, but unproven to date;
- Satellite high-speed downstream and eventually upstream data—also mostly fill in, can be in less-dense affluent suburbs where DSL is infeasible as well as rural, as competitor to DSL or cable; and
- Unlicensed "WiFi" (i.e.,802.11b).

Potential Wireless Competitors in Multichannel Video

- Direct broadcast satellite (DBS);
- "Wireless cable"/MMDS/ITFS;
- MVDDS enhancing DBS;
- Digital television (multichannel); and
- LMDS (unproven).

In general, the group finds that wireless has genuine potential to compete with wireline providers in the voice telephony and narrowband data markets. For broadband, the general sense of the group (with some slight dissent) was that at least for the five-year time horizon, wireless will provide service in low-density suburbs and rural areas and offer limited price/quality competition to cable modem and DSL service. The same general agreement was reached with regard to video, with the belief that cable and DBS may be supplemented by some wireless suppliers using other technology. Of course, DBS itself is a wireless alternative to cable, though there was disagreement among group members about whether it competes sufficiently on price and service to qualify under our definition of "competitor."

Turning first to voice telephony, we believe that CMRS has the potential to become a viable competitor to wireline. There are some caveats. Although in many areas the monthly charge for a reasonable "bucket" of minutes of local and long-distance minutes (including vertical services such as caller I.D. and voicemail) now comes close to the cost of service from the incumbent local exchange carrier (ILEC), plus average long-distance usage, and vertical service charges, there are differences

that may limit substitutability. Most important, perhaps, if a family replaces its wireline phone with a single cell phone, other members of the family will be unable to make or receive calls when one member takes the phone out of the house. "Family circles" and other arrangements for sharing ultimately may remove such issues, and in any case the mobility of CMRS adds value that simply is not available from a fixed landline phone.

Policy Goals and Options

Policy Goal #1: Expand the amount of spectrum available to CMRS so that it can meet market demand. The group discussed several actions that government might take to augment spectrum available to CMRS.

- **Reallocate spectrum to CMRS, and do not make these frequencies subject to the current spectrum cap.** At least in theory, increasing the amount of spectrum for CRMS and placing the new frequencies outside the reach of the caps could result in maintaining six independent suppliers while giving some of them more room to expand and compete.
- **Raise or eliminate the spectrum cap to allow carriers to own more than 45 MHz in a given market**. For carriers that now are unable to provide all customers with the services and quality they would like, this option would enhance offerings and thus make the carriers more effective competitors to wireline voice. The group noted that a considerable expansion of the usable spectrum could be achieved by enhancing efficiency in spectrum usage. Several steps would make more spectrum available functionally without creating new potential for market concentration.
- **Require government users to become more efficient, which makes more spectrum available for commercial use.** This goal could be accomplished by requiring migration to digital equipment and other specific efficiency measures or by a less directive mandate that government users pay a fee for spectrum use, giving agencies an incentive to become more efficient.

- **Have the Federal Communications Commission (FCC) amend its requirement that 800 MHz cellular operators keep large amounts of spectrum available for analog service to serve legacy customers; require instead phased migration of all feasible customers from analog to digital.** These analog customers make far less efficient use of the spectrum than digital customers, and eliminating the large analog customer base in many markets would make substantial amounts of spectrum available for digital service.
- **Mandate more selective handsets, which would allow more signals to be squeezed into current bandwidth.** Less-selective handsets are less expensive to manufacture but result in spectrum inefficiency so that providers use more spectrum to keep adjacent signals from interfering with each other.

Policy Goal #2: Create "more" spectrum for competitive service by encouraging spectrum flexibility and sharing. Group members endorsed two specific actions:

- **Permit voluntary reallocations through private transactions.** Thus, if services for which licenses are granted do not develop, licensees should be permitted to use that spectrum for more beneficial purposes. Reallocations are complicated by a variety of factors. For instance, many different providers occupy relevant frequency bands (e.g., educational users, which use and lease ITFS frequencies to commercial users), and adjacent channel interference often arises. If government proactively stepped in and cleaned it up, making whole everyone who might lose from reallocation, it could enhance the ability to provide useful spectrum flexibility.
- **Permit spectrum sharing (e.g.,satellite spectrum shared with terrestrial use) on a noninterfering basis.** One issue that arose with regard to this option was whether permission to use spectrum for the new purpose—such as terrestrial communications employing both satellite and terrestrial frequencies—should entail having providers who might originally have received free spectrum pay fees for the new uses as a way of maintaining competitive neutrality.

Policy Goal #3: Avoid policies that create disincentives to wireless investment. Again, the group approved two specific steps:

- **If mobile wireless (CMRS) becomes a viable substitute for wireline voice, do not subject operators to new regulation.** The group found a need to reduce regulatory uncertainty, particularly the fear of states regulating CMRS if penetration increases and substitutability for wireline develops. CMRS should not be penalized for success. The concern is that the 1996 Telecommunications Act—Section 332C(3) in particular—seems to permit states to reregulate CMRS if wireless becomes a widespread substitute for wireline. Number portability, emergency 911,CLEA,and a few other provisions already are required under federal regulation; the goal should be that any terms and conditions required by states should not become de facto rate or price regulation. The Kansas ILEC petition against Western Wireless offers a current illustration of the wireless operators' concerns.
- **Modify universal service obligations when they are applied to wireless providers.** Wireless carriers should be entitled to eligible telecommunications carrier (ETC) status, under which the desirable step would be to give means-tested subsidies directly to end users, who could choose wireless or wireline. An alternative would be to have wireless and wireline carriers bid for the right to serve subsidized customers.

The group recognizes explicitly that some of the foregoing steps could allow consolidation in the wireless market. The FCC's CMRS spectrum auctions of the 1990s were designed with caps in large part to ensure the emergence of robust competition with as many as six providers. Enlarging or eliminating the caps probably would lead to carrier mergers and acquisitions. The group could not agree on a numerical limit to consolidation. Some members of the group felt that four independently owned providers would be the minimum needed to provide genuine price-constraining competition and prevent undue market power. Others felt that this number was arbitrary and that a more calibrated market-by-market analysis might be needed. Furthermore, the relevant factor might not be the number of providers so much as how much spectrum each has. Whether a wireless carrier were owned by the in-

region ILEC also might be important to competitive analysis. In any case, the group agreed on the following policy goal.

Policy Goal #4: To achieve effective competition within the wireless market and between CMRS providers and the ILEC, public policymakers (whether antitrust agencies or the FCC or both) should see to it that the market remains subject to price and quality-constraining competition. In addition, the group suggests that officials permit but monitor economies of scope in wireless to ensure that they do not produce excess market power. The group recommends that policymakers keep careful watch. At this time, however, no clear economies of scope have emerged with respect to ILECs' ownership of CMRS providers. The FCC's ILEC/CMRS separate subsidiary requirement sunsets on January 1, 2002, although it never applied to rural ILECs.

Applying the Layer Model to Openness in Wireless Service

An issue for consideration regarding future wireless services (particularly those involving data as well as voice) is the degree to which various layers of the services are open. We can consider "openness" at three points: the data link layer (i.e., the radio frequency or RF interface), the protocol and applications layers, and the content layer.

Policy Goal #5: Open CMRS at the content,application, and protocol layers, while protecting the integrity of data link (RF) layer. The group considered this issue specifically in the context of CMRS handsets and the potential they have to offer more than standard voice telephony service.

- **RF Interface Openness**. The issue here is the degree to which users can select from their handsets among a set of carriers who may provide service to a current location. Clearly, the handset must protect the integrity of the RF interface itself. However, a user may desire—particularly if roaming—to manually select the carrier used on the basis of price or service differences.
- **Protocol and Application Openness**. As handsets become smarter and networks begin to offer increasingly higher level services, the question of who may load what applications onto a handset and what network-based service interfaces these applications may access becomes interesting. Is a user restrict-

ed to the applications that are offered by the primary service provider, or may other applications be loaded? Furthermore, can these applications have full access to the functions of the network and the handset? These questions may be best illustrated with some examples.

Suppose a brokerage wants to offer a handset application that uses the screen and alerting capabilities (sound or vibration) of a handset to provide a service to its client. This application requires that the code at the handset have access to the application program interfaces (APIs) that access the handset functions; it also requires that the service have access through the network to get messages to that application. Does deployment of such an application require the cooperation of the wireless service provider? In today's Internet, deployment of such an application on an end-system PC would not require any support from the Internet service provider (ISP). Will the same be true for wireless?

As a second example, suppose a company wishes to deploy a universal messaging application that can alert users to any e-mail or voice messages that they have on any of several message queuing services. This application requires access to the alerting indicators of the handset, and it may require access to the voicemail service inherent in the wireless provider's service so that messages queued there can be included in the new service. Do the necessary APIs and addressing paths exist to allow such an application?

As a final example, suppose a consumer wants a vending machine with an infrared or Bluetooth interface to interact with a handset, allowing communications with a back-end billing service. This service requires a digital certificate to be sent from the machine through the handset to the back-end service, followed by an authorization certificate being sent back via the same path to the machine. Again, this process requires the application to have access to specific functions of the handset (probably the infrared port, the screen to present selections, and the buttons to select). Can this application be deployed without the cooperation of the wireless service provider?

- **Content Openness.** This type of openness may be the easiest to consider because it is essentially browser-level openness. The question can be reduced to whether the user can enter an arbitrary web address (URL) to a network portal to access content (independent of any business deal between the wireless provider and particular content providers) and whether browser plug-ins can be created and downloaded to render the resulting content, if required. This issue is analogous to the debates over "walled gardens" in the wired Internet world, wherein ISPs restrict their customers' access to websites beyond those the ISP preselects or creates.

Given this potential for opening access to achieve new benefits for users, the group did not reach consensus on all policy options. The group did agree that if there is a large number of wireless competitors (the number most frequently mentioned was six), the market is more likely to result in at least one operator permitting access to third-party equipment and applications. This arrangement could prove a catalyst for other wireless operators to open their offerings. Beyond this consensus, group members endorsed one option—permitting CMRS carriers to open the relevant interfaces—and disagreed on the second: If there is an insufficient number of CMRS operators, requiring them to open interfaces because a reduction in competitive pressure resulting from consolidation may diminish their incentives to do so.

Opening the "Walled Airwave"[1]

by Eli Noam

The logic of the layered approach to regulation is that business and policy approaches that have been used for other communications media become more relevant than under a separated "silo" approach. This logic is true as we look at the future of mobile wireless. As long as mobile telephony was used primarily as a fancy cordless phone for voice calls, it could occupy a separate niche, with its own policy approaches. This approach worked reasonably well—although the mobile wireless industry in the United States has not exhibited quite the same dynamism as that of the mobile sector of several other advanced countries, or of the Internet.

In the United States, government if anything often has been the brake, not the engine. In the emerging third generation of wireless, U.S. policy again is slow and uncertain. Less spectrum is allocated in the United States for cellular use than in Europe or Japan. Allocation of spectrum has been a near-farcical process of bargaining among entrenched industries and bureaucracies. Fortunately, the Europeans and Japanese have encountered problems of their own that permit us to pretend that we have engaged in a process of grave policy deliberation, instead of simply being unable to get our house in order. We should also note that one of the main problems Europeans have encountered is caused by the auction with up-front payment process, a successful U.S. export that had received the eager attention of European budget officials.

The major problem with the emerging wireless environment is that it is vertically integrated in ways that have become unthinkable in other media. Could one imagine a telephone carrier that can limit user access to its own Internet portal that can select the accessible websites that can control the type of telephone equipment its users are attaching and the software that these users are downloading? These limitations have not been particularly noticeable in the past, when cell phones could be thought of as some kind of advanced cordless phone

for the car. Cell phones, however, are becoming much more than that, for more people, and more like computer terminals on the go.

Each of these setbacks can be explained. Collectively, they raise the question of whether we are proceeding with the right strategy or whether we have the fundamentally wrong approach. It is rare to find European telecommunications policy being more pro-openness and pro–consumer choice than American policy,[2] but this situation is the case for wireless communications.

American telecommunications and information policy has been at its strongest when it focused on consumer choice and lowering of entry barriers. This approach translated to a willingness to let control over communications shift from the core of the network to the periphery and for the core of the network to be competitive. The Internet is the classic manifestation of this philosophy. Its success—in contrast to government-sponsored, centralized, PTT-driven videotex operations such as the Minitel, BtX, Captain, Prestel, and so forth—has demonstrated the fundamental strength of this model.

Therefore it is regrettable that the FCC apparently has not applied the lessons from past successes to wireless. It is never too late, however. A new crew is at the oars and tiller, and the Commission might take a new look before it becomes responsible for yet another $20 billion or more in forgone future benefits.

The main characteristic of the wireless business is that the customer is a contractual subscriber who is served horizontally by a wireless carrier that provides a full bundle. The carrier:

- Selects, markets, and approves the customer handset and connects it to its network;
- Provides, selects, and adopts many of the features, capabilities, and content resident on the handset;
- Operates the wireless portion of the communications path;
- Operates or provides the local fixed-line distribution;
- Operates or selects the long-distance carrier;

- Selects, for areas in which it does not provide service itself, a partner mobile carrier that services the subscriber, at rates negotiated and billed by itself;
- Provides software defined functionalities on the network;
- Selects and approves services resident on the network and provided by itself or by third parties; and
- Controls access to a radio portal, and its content and features, by the providers linked by that portal, as well as the placement of these links.

One can readily recognize issues that have bedeviled fixed-line telephony and cable television. Among the issues that can be identified with this arrangement are the following:

- Reduction or lack of customer choice in applications and content;
- Reduction in innovation of service provision as a result of the closed nature of the applications and software that can be offered by third parties;
- Absence of choice for customers to use, where more advantageous, alternative wireless arrangements are possible, such as wireless LANs,other carriers for roaming, or stronger signals of another carrier;
- Market power with respect to vendors of m-commerce (mobile commerce) and requirements on such vendors to become business partners;
- Selectivity over content, which would be particularly troubling if the wireless medium were to become a mass medium with video, audio, and text; and
- Carriers can prevent intercarrier transfer of instant messaging.

This arrangement resembles the "walled gardens" of some Internet portals provided by cable companies but potentially goes far beyond that scheme. One can term this arrangement the "walled airwave" system.

Absence of Convenient Choice Among Different Types of Wireless Services

In the past, cellular phone service constituted an end-to-end service, separate from other services. Other wireless services also are being offered, however. Paging has long been a widespread service, and smart paging via narrowband PCS (personal communications service) has gained increasing popularity. An example is the BlackBerry pager for always-on e-mail. Some of these services are being offered on cell phone terminals—but only using the cellphone frequencies, as opposed to being allowing switching to the service provided by another paging company. Furthermore, a cell phone terminal could be used directly as a terminal for a cordless phone at home or at the office, without going through the wireless network. Similarly, it could be used as a "walkie-talkie" between several other cell phones in a neighborhood, again without going through the network. (Nextel provides this popular feature for its own subscribers.) It could be a terminal to the type of data services pioneered by Ricochet. The cell phone terminal also could bypass the wireless network through wireless local area networks (WLANs). The cell phone terminal could be used as a radio receiver for broadcast programs, a scanner for police frequencies, an advanced pager, a ham radio, a marine radio, and so forth. It might be used in a peer-to-peer fashion, bypassing carriers altogether. It is time to think of what we now call the cell phone handset as a future general multi-purpose wireless terminal—not as an end point of a specific wireless network but as the starting point of use applications, using whichever wireless system fits best.

Approval of handsets by carriers and by the FCC is a two- or even three-stage process. The FCC (and similar regulatory bodies elsewhere) issues specifications regarding the radio (RF) and health aspects (SAR) of equipment. A second stage of approval involves the air interface standards that govern transmission from the handset to the base station, such as CDMA (technical standard IS 95), TDMA (IS 136), I-Den, and GSM. These standards are set by a variety of manufacturer-driven groupings. The decision about whether to approve a particular handset for connectivity, however, lies within the discretion of the carrier

because that carrier is entirely free,in the United States,made the FCC's PCs tales to select its standard. In Europe, by contrast, any equipment that complies with GSM specifications will be connected to the network. There is no carrier discretion. In the United States, the Cellular Telecommunications Industry Association often certifies a manufacturer's equipment to the industry, but each carrier can add its own requirements and flavor of specifications. As a consequence, large carriers also test and approve equipment for connection to their networks. Hence, mere adherence by a manufacturer to the standard specifications in the United States is not enough. The manufacturer also must find favor with the carrier. There is no right to use equipment to connect to a cellular network.

The handset makers also tend to be major suppliers of network equipment. Manufacturers would not lightly put used equipment into the marketplace that would be disfavored by the carriers as threatening their basic business by facilitating access to services such as WLAN that compete with the business of their best customers.

Implications for Public Policy

The foregoing section identifies the potential for real problems. Recognition of such issues does not mean, however, that regulatory approaches are needed. Vigorous competition among mobile carriers could overcome most issues and generate unbundling through market forces. At the same time, the ability to exercise market power with respect to mobile commerce providers or wireless LANs might be common to all mobile providers and more profitable than a more open system. In such a case, market forces might not lead to unbundling.

The knee-jerk response to the problems identified above is that competition will take care of it. Suppose, however, that carriers would be consistently worse off by offering consumers the choice of moving easily around to other carriers or service providers. Such competition would reduce prices and profitability. On the other hand,it would grow the market. It is quite likely, however, that each carrier would be better off servicing a less-competitive slice of a smaller market, rather than engaging in greater competition in a larger market.

It is not clear why a carrier A would be the first to offer such choice to its customers. After all, it would provide an exit to its own customers, without a potential compensating gain from the customers of carriers B and C. The main reason would be to hope that enough users of carriers B and C switch their subscriptions to A in order to have the choice of not using A. This hope can hardly be a strong selling point. Furthermore, any choice requires the consent and cooperation of B and C, which might not be forthcoming once they realize that they are opening the door to a mutually destabilizing competition. They will be concerned with reputation effects if they are blamed in users' mind with poor performance caused by an element not under their direct control. They also might be able to use bundling as a way to price discriminate, as George Stigler has pointed out in a different context. The likelihood of oligopolistic behavior within a small group of carriers is high. As the number of competitors shrinks, each has less to gain and more to lose by maverick behavior. It also is an inhibitor for any software developer to take initiatives for new applications if the market is largely closed, which further reduces the attractiveness of any nonconforming behavior by a carrier.

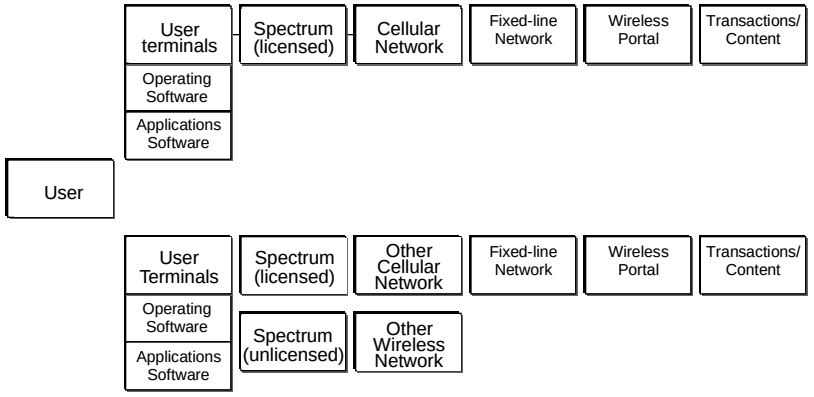
Where market forces do not work, would regulation?

A schematic view of an unbundled wireless network environment is provided in Figure 1. It shows, at each stage of the chain of wireless provision, alternative providers. We conclude that only one factor—openness of the terminal equipment to access multiple providers of wireless services and providers—is critical. (A subsidiary second opening—unlicensed spectrum—would support such policy but is not essential).

Separation of the User Equipment (UE) From the Carrier

Such a policy would simply be a "Carterfone" policy for users' wireless equipment. Following *Carterfone*, the FCC permitted users to attach equipment chosen by themselves to the telecommunications network. Although the carrier could still offer and market its preferred equipment, it could not exclude other equipment as long as that equipment conforms to certain technical specifications pertaining to the RF transceiving function and nondiscriminatory industry specifications for air interfaces standards. These specifications could not close equipment third-party applications or

Figure 1



access to other network protocols offered by other types of providers, as long as it conforms to the FCC's new and constructive rules on software-defined radio. Although a carrier could offer a fully bundled service as before, the carrier could not prevent a user from selecting another wireless service provider for any given call or using the equipment for other communications purposes.

The significance of such an arrangement is that equipment will be offered by the market that adds features and, more important, permits a user to select service providers depending on circumstances. For example, a user in a shopping mall,campus, office building, or airport could connect to a wireless LAN. A user encountering a circuit busy could switch to another carrier. A user seeking to receive synchronous music, radio style, could do so by accessing a specialized broadcaster.

This choice would reduce the need for most other access requirements because the user would not be tied to a single carrier with significant costs of switching to another. This arrangement is partly embodied in the GSM standard, which provides some user selectivity over carriers, although approval of such alternatives remains with the primarily carrier, which also handles the billing.

This approach would be similar to that adopted by the FCC for customer premises equipment following the *Carterfone* decision in 1968. The approach followed Cassandra warnings of impending network chaos, but it has worked spectacularly well.

Access to Unlicensed Spectrum

The key source of leverage for carriers is the high entry barrier for new and future entrants in service provision arising from the spectrum auctioning system with its advance payment feature. Given the difficulty in freeing additional spectrum and the high cost of acquiring it, it seems unlikely that there would be new entrants emerging to challenge the reduced group of carriers. Therefore, government should provide adequate spectrum on a license-free basis, with users and service providers paying for usage rather than for ownership, in the way that users pay for the use of highways through tolls and gasoline taxes. This has been developed in detail by the author in other papers.[3]

Once such spectrum is available,and once users' terminals can access service providers such as WLANs operating on such spectrum, users will not be constrained by the limited choice of perhaps four cellular carriers that could still collectively be restrictive.

Conclusion

The focus of FCC policy has been to provide carriers with choice: in the utilization of licensed frequency, in the technical specifications of its service, in pricing, and so forth. There does not seem to have been a similar orientation toward choice for users—broadly defined as consumers and providers of various attached services. The implicit notion was that providing carriers with options and creating competition will serve users well. That approach certainly goes a long way. Yet carriers are likely to resist offering consumers the choice of moving easily around to other carriers and other types of wireless, portals, and content. Such competition would reduce prices and profitability.

The conclusion of the analysis is that the key point of openness, and arguably the only one needed, is openness of user equipment. With this openness achieved, the user would have alternative avenues to spec-

trum, content, portals,applications, software,and so forth.A secondary policy would be to assure alternative wireless pathways such as WLANs by providing an adequate amount of unlicensed spectrum.

Why is all of this important? The overall goal of the openness approach is to establish for the wireless environment the same dynamism as in the Internet, with its open access terminals—especially the PC—encouraging hardware and software innovation and applications. Cellular telephony is a dynamic sector right now, mostly because of the growth of penetration. Soon,however, this growth will plateau as universal wireless connectivity is approached. At that point, we will need the impetus for further innovation that a more open system provides. For carriers, the overall positive impact in terms of traffic generation may well outweigh some loss of control. For users, service providers, and technology developers, the advantages of openness might be significant.

American communications policy has fared best when it puts its faith in the dynamism of the periphery of the network, instead of seeking to strengthen the ability of the network core to dominate. Wireless is no exception. The mediocre results of policies focusing on the core, in contrast to those for other parts of the communications environment, suggest that a reorientation is in order. The key step now is to follow the opening set by the FCC for software-defined radio by a *Carterfone*-style opening to equipment that can access multiple wireless networks. With it we can leapfrog the "3G" model, with its carrier orientation, to a "4G" model patterned after the Internet.

Notes

1. This paper is an excerpt of the discussion paper, "The Next Frontier for Openness: Wireless Communications," prepared for the 2001 Telecommunications Policy Research Conference, October 26, 2001.

2. See Eli M. Noam, *Telecommunications in Europe*, Oxford University Press,1988.

3. See Eli M. Noam, "Spectrum Auctions: Yesterday's Heresy Today's Orthodoxy, Tomorrow's Anachronism. Taking the Next Step to Open Spectrum Access," The Journal of Law and Economics, vol.XL1 part 2, pp. 765-790.

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Robert M. Entman; professor and head of the department of communication at North Carolina State University, received a Ph.D. in political science from Yale University and an M.P.P. in policy analysis from the University of California, Berkeley. His research and teaching interests focus on political communication and communication policy. His books include *Media Power Politics* (Free Press, 1981, with D. L. Paletz); *Democracy Without Citizens: Media and the Decay of American Politics* (Oxford, 1989); and *Mediated Politics: Communication in the Future of Democracy* (Cambridge, 2000, edited with W. L. Bennett). His recent book, *The Black Image in the White Mind: Media and Race in America* (Chicago, 2000, with A.Rojecki) won the Frank Luther Mott prize for best research book in journalism and mass communication from Kappa Tau Alpha,the journalism honorary society, and the Robert E. Lane Award for best book in political psychology from the American Political Science Association (political psychology section). A former National Science Foundation Graduate Fellow and National Institute of Mental Health Post-Doctoral Fellow who was the Laurence Lombard Visiting Professor at Harvard during the fall 1997 semester, Dr. Entman taught previously at Duke and Northwestern. He has long worked with the Aspen Institute on telecommunications policy issues, and he worked at the National Telecommunications and Information Administration and the House Subcommittee on Telecommunications for brief periods during the 1980s. He is completing a book titled "Framing News: Media, Public Opinion, and the National Defense" and is beginning work on a new book that explores media bias and American politics. With Lance Bennett, he edits the book series *Communication, Society and Politics* for Cambridge University Press.

Eli Noam has been professor of economics and finance at the Columbia Business School since 1976. After serving for three years as commissioner with the New York State Public Service Commission, he returned to Columbia in 1990. He now is director of the Columbia Institute for Tele-Information—an independent, university-based

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