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TELECOMMUNICATIONS POLICY: A LOOK AHEAD

HEARING

BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

APRIL 28, 2004

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

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TELECOMMUNICATIONS POLICY: A LOOK AHEAD

WEDNESDAY, APRIL 28, 2004

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 9:35 a.m. in room SR–253, Russell Senate Office Building, Hon. John McCain, Chairman of the Committee, presiding.

OPENING STATEMENT OF HON. JOHN MCCAIN, U.S. SENATOR FROM ARIZONA

The CHAIRMAN. Today we will continue to look at the Telecommunications Act of 1996 to identify the successes and failures of that law. Today we look ahead to consider potential reforms to our telecommunications policy given advances in technology. This examination is important because numerous members have discussed reforming the Act. It's imperative that any new legislation will provide a more streamlined statutory framework for a telecommunications policy in the 21st century, one in which technological innovation could flourish, competition could thrive, and the need for regulation is either eliminated or greatly reduced.

I thank the witnesses for being here today and I look forward to their testimony.

Senator Lautenberg.

STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM NEW JERSEY

Mr. LAUTENBERG. Thanks, Mr. Chairman. Today's hearing, like the one yesterday, has a similar focus, and that is on the deployment availability and adoption of broadband technology, which fits into the whole examination picture that we have regarding telecommunications. We need to examine which would be a better use of scarce Federal resources, to subsidize more broadband deployment or encourage Americans to use the broadband technology that already exists.

My view is that broadband technology is deployed pretty widely already. According to a report from CBO, the United States has the largest absolute number of subscribers to both high-speed and dial-up services. That's not as surprising as it would be if we looked at the relative use. I think the CBO report also found that by most measures United States businesses and consumers make more and better use of the Internet than do their counterparts in other nations.

But we do fall short in one important area, and that is broadband use. There are just 6.9 broadband subscribers for every 100 people, a rate that places us only the sixth highest in the world. Now the question is, how do we entice consumers to switch to broadband, to switch to this much more efficient use of our telecommunications line? One application which will help is Internet telephony, which is often referred to as Voice over the Internet Protocol, or VoIP.

Three Baby Bells: Verizon, SBC, and Qwest; three of the largest telephone companies: AT&T, Sprint, & MCI; and three cable companies: Comcast, Time Warner, and Cablevision have all recently announced their entry into the VoIP market. I find this development encouraging, because consumers will have their choices for their telephone service more available, and that should lead to competitive pricing and more features.

Now, using the Internet protocol facilities, providers like Time Warner Cable and non-facilities-based providers like Vonage are capable of providing comparable phone service to consumers at reasonable rates. Consumers are responding. Earlier this month, Edison, New Jersey-based Vonage as a provider of phone service over high-speed Internet lines, signed up its 150,000th customer. They're not in business very long and their pace of acquisition of subscribers is accelerating. It's twice the number of subscribers they had less than 5 months ago.

So it's exciting to talk about new technologies like broadband and new applications like VoIP, and Mr. Chairman, I look forward to hearing from our experts today to hear more about broadband technology and how we can get more Americans to use it. I thank you.

The CHAIRMAN. Thank you. Senator Burns.

STATEMENT OF HON. CONRAD BURNS,
U.S. SENATOR FROM MONTANA

Senator BURNS. Thank you, Mr. Chairman, for having the hearing. I have no opening statement. I am interested in listening to the witnesses and asking them some questions. It is nice to see some familiar faces back. Thank you very much.

The CHAIRMAN. Thank you. We have some very smart people here today and we thank you all for coming. We have Mr. Adam Thierer, who is the Director of Telecommunications Studies at the Cato Institute; Mr. Charles Ferguson, a Senior Fellow of Economic Studies at the Brookings Institute; Mr. George Gilder, the Senior Fellow Technology and Democracy Project at the Discovery Institute; Mr. Reed Hundt, well known to all of us here, Former Chairman of the Federal Communications Commission; and Mr. Raymond Gifford, the President of the Progress and Freedom Foundation.

Mr. Thierer, we'll begin with you.

STATEMENT OF ADAM D. THIERER, DIRECTOR,
TELECOMMUNICATIONS STUDIES, CATO INSTITUTE

Mr. THIERER. Thank you, Mr. Senator. Good morning. My name is Adam Thierer and I serve as Director of Telecommunications Studies at the Cato Institute. Thank you for your invitation to tes-

tify here this morning as the Committee begins its important business of thinking about what the next Telecom Act should look like.

As someone who worked closely with the Committee and Members of this Committee a decade ago when we started getting serious about telecom reform, I think it's safe to say that we all share a sense of frustration and disappointment that we were not able to advance the ball a little further the last time around. Perhaps it was wishful thinking to believe we could have undone a century's worth of regulation in just a few short years, but one would have at least hoped that we would not be stuck today still debating the same issues we were 10 years ago.

Indeed, if Rip Van Winkle fell asleep in 1994 and woke up in 2004, he wouldn't think he'd missed a beat if telecom regulation was any guide. But despite the ongoing regulatory quagmire, the good news is that we've witnessed amazing strides in terms of technological progress and we can confidently say that this marketplace has never witnessed such competitive forces at work.

Still, much remains to be done to clear out the regulatory deadwood that continues to hold back further innovation and competition. In my limited time here today, I'll just outline what I think are the three most important overarching themes that should be addressed as part of any reopening or reassessment of the Telecom Act. It would include the rationalization of regulatory classifications, dealing with jurisdictional matters, and getting agency power and size under control.

With respect to regulatory classifications, a general consensus exists today that Congress will need to formally close the book on the archaic regulatory classifications of the past, which pigeonhole technologies and providers into distinct vertical policy silos or titles. Although the communications and broadband marketplace is essentially becoming one giant fruit salad of services and providers, regulators are essentially still separating out apples and oranges and bananas and regulating them all differently. This must end.

One way to do this is to replace vertical silos or titles in the Act with horizontal layers. But I would caution Congress against formally enshrining a network layers model as the new regulatory regime for telecommunications. While it provides a good analytical model to help us rethink and potentially eliminate the old vertical silos, we do not want the layers to become the equivalent of rigid regulatory quarantines or firewalls on industry innovation.

A potentially better way to tear down the old paradigms and achieve regulatory parity is to borrow a page out of trade law and institute the equivalent of a most favored nation clause, or MFN principle, for communications. In a nutshell, the policy would state that any communications carrier seeking to offer a new service or entering a new line of business should be regulated no more stringently than its least regulated competition. This would allow us to achieve the simplicity and parity we're looking for not by regulating up, but by deregulating down.

Second, on jurisdictional matters, which could very well end up, I believe, being the most controversial issue this committee will face as it reopens the Act, I think we need to think seriously about reforming these policies. Specifically, we know that decentralization of political power almost always has a positive effect in terms

of expanding human liberty. But our founders also realized that there were times that there are some important exceptions to that rule.

So let me be perfectly blunt on this point. Telecommunications regulation is one of those cases or areas where state and local experimentation just doesn't work so well. After all, the very heart of the notion of telecommunications lies the idea of transcending boundaries and making geography and distance irrelevant. If ever there was a good case to be made for an activity being considered interstate commerce, this is it. And yet, America's telecom market remains riddled with a patchwork of policies that actually thwart that goal and seek to divide the indivisible and place boundaries on the boundless. This too must end, and the only way it will is by Congress taking the same bold and difficult step it did when deregulating other issues and areas. We must get serious about a national policy framework mentioned in the Telecom Act and preempt state and local regulation of the sector.

My third and final big picture reform involves what may be the biggest glaring omission from the Telecom Act in my opinion, the almost complete failure to contain or cut back the size and power of the FCC. Again, we would do well to remember the lessons of the past. When Congress deregulated other sectors, lawmakers wisely realized that comprehensive and lasting reform was only possible if the agencies that oversaw those sectors were also reformed or even eliminated.

In the telecom world, by contrast, the FCC has grown larger and more powerful in the wake of reform with spending, staffing, and paperwork all up significantly. It's safe to say that you cannot deregulate an industry by granting regulators more power over that industry. So this too must end.

The next cut at the Telecom Act must do more than just hand the FCC vague forbearance language with the suggestion that the agency take steps to voluntarily regulate less. We can't expect regulators to deregulate themselves. We need clear sunsets on existing FCC powers, especially the infrastructure-sharing provisions of the last Act, and then we need to impose sunsets on any new transitional powers we grant them in the next Telecom Act and we need funding cuts too. If we fail to do so, I fear we'll be sitting here again in 10 years having the same conversation all over again.

In conclusion, we have a chance to do more than just make a clean break with the past. We have a chance to now close the book on a regulatory past that has done little to truly benefit consumers. Regulators have been given over 100 years to conduct a grand experiment with telecommunications markets. Why not give markets a chance for once? Thank you, Mr. Chairman. I'm happy to take questions.

[The prepared statement of Mr. Thierer follows:]

PREPARED STATEMENT OF ADAM D. THIERER, DIRECTOR, TELECOMMUNICATIONS STUDIES, CATO INSTITUTE

Good morning, my name is Adam Thierer and I serve as Director of Telecommunications Studies at the Cato Institute. Thank you Mr. Chairman for your invitation to testify here this morning as the Committee begins the important business of thinking about what the next Telecom Act should look like.

As someone who worked closely with members of this Committee a decade ago when we started getting serious about telecom reform, I think it's safe to say that we all share a sense of frustration and disappointment that we were not able to advance the ball a little further last time around.

If I had to summarize what went wrong with the Telecom Act of 1996, I would use the following paradox: Congress wanted market competition but did not trust the free market enough to tell regulators to step aside and allow markets to function on their own.

Consequently, the FCC, the Department of Justice, state and local regulatory commissions, and the courts, have spent the last ten years treating this industry as a regulatory plaything to be endlessly toyed with. Today there is virtually no element of telecommunications that is not subject to some sort of meddling by some or all of these regulatory officials.

While it's fair to say that it was probably wishful thinking to believe we could have undone a century's worth of command and control regulatory policies in a few short years, one would have at least hoped that we would not be stuck still debating the same issues today that dominated the agenda over a decade ago. Indeed, if Rip Van Winkle fell asleep in 1994 and woke up in 2004, he wouldn't think he'd missed a beat if telecom regulation was any guide.

But despite the ongoing regulatory quagmire, the good news is that we have witnessed amazing strides in terms of technological progress and we can confidently say that this marketplace has never witnessed such competitive forces at work. Whether it's the wireless revolution that is allowing millions to cut the cord entirely, or the Internet and broadband revolution that is opening up a whole new world of opportunities that did not exist prior to 1996, by almost any measure, consumers are better off and have more choices now than ever before.[1]

Still, much remains to be done to clear out the regulatory deadwood that continues to hold back further innovation and competition. While there are dozens of important regulatory reform objectives I could outline,[2] in my limited time here today it makes more sense to briefly discuss the three most important over-arching themes or priorities that should frame our current thinking about how to reform telecommunications policy. These priorities include:

(1) Rationalizing *Regulatory Classifications*

(2) Dealing with *Jurisdictional Matters*

(3) Getting *Agency Power* and Size Under Control

Regulatory Classifications

With respect to regulatory classifications, a general consensus exists today that Congress will need to formally close the book on the archaic regulatory classifications of the past, which pigeonhole technologies and providers into distinct vertical policy "silos." That is, we still have Title II for common carriers, Title III for wireless, Title IV for cable, and so on, even though rapid technological change and convergence have largely wiped out such distinctions and pitted these formerly distinct sectors against one another in heated competition for consumer allegiance. Thus, although the communications/broadband marketplace is becoming one giant fruit salad of services and providers, regulators are still separating out the apples, oranges, and bananas and regulating them differently. This must end.

One way to do this is to replace the vertical silos model with a "horizontal layers" model that more closely resembles the way the new marketplace operates. We can divide the new industry into at least four distinct layers: (1) Content; (2) Applications; (3) Code; and, (4) Infrastructure, and regulate if we must, each accordingly.[3] But I would caution Congress against formally enshrining a network layers model as a new regulatory regime. While this model provides a useful analytical tool to help us rethink and eliminate the outmoded policy paradigms of the past, we would

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[1] Adam Thierer, "Number Portability Decision Adds to Wireline Telecom Sector's Perfect Storm," Cato Institute *TechKnowledge* No. 66, November 20, 2003, *http://www.cato.org/tech/tk/031120-tk.html*,

[2] Adam Thierer, "A 10-Point Agenda for Comprehensive Telecom Reform," Cato Institute *Briefing Paper* No. 63, May 8, 2001, *http://www.cato.org/pubs/briefs/bp-063es.html*.

[3] See generally: Richard S. Whitt, "A Horizontal Leap Forward: Formulating a New Public Policy Framework Based on the Network Layers Model," *MCI Public Policy Paper,* Version 1.0, December 2003, *http://global.mci.com/about/publicpolicy/presentations/horizontallayerswhitepaper.pdf*

not want these new layers to become the equivalent of rigid regulatory quarantines or firewalls on industry innovation or vertical integration.[4]

A second and better way to tear down the old regulatory paradigms and achieve regulatory parity would be to borrow a page from trade law and adopt the equivalent of a "most favored nation" (MFN) principle for communications. In a nutshell, this policy would state that: "Any communications carrier seeking to offer a new service or entering a new line of business, should be regulated no more stringently than its least regulated competitor." This would allow us to achieve regulatory simplicity and parity not by "regulating up" to put everyone on equal difficult footing but rather by "deregulating down."[5] Given the confusion over the *Brand X* court case and the ongoing FCC investigation into a Title 1 "information services" classification for broadband, this "Most Favored Nation" approach might help us bring some resolution to this difficult issue.

Jurisdictional Matters

Next we come to jurisdictional matters, which could very well end up being the most controversial issue this Committee will take up if you choose to re-open the Telecom Act. Here I am speaking of the heated debate between federal, state and local regulators for control over the future of communications policy.[6]

As I noted in my 1998 book *The Delicate Balance: Federalism, Interstate Commerce and Economic Freedom in the Information Age,* decentralization of political power almost always has a positive effect in terms of expanding human liberty.[7] But as our Founders wisely realized when penning the Constitution, there are some important exceptions to that general rule.

Let me be perfectly blunt on this point: Telecommunications regulation is one of those cases where state and local experimentation doesn't work so well. After all, at the very heart of telecommunications lies the notion of transcending boundaries and making geography and distance irrelevant. If ever there was a good case to be made for an activity being considered interstate commerce, this is it. And yet, America's telecom market remains riddled with a patchwork of policies that actually thwart that goal and seek to divide the indivisible and place boundaries on the boundless.[8]

This must end. And the only way it will end is by Congress taking the same difficult step it had to take when deregulating airlines, trucking, railroads, and banking: pre-emption. We must get serious about the "national policy framework" mentioned in the preamble of the Telecom Act by comprehensively pre-empting state and local regulation in this sector. The rise of wireless and Internet-based forms of communications makes this an absolute necessity.

If you feel compelled to leave some authority to state regulators, why not devolve to them any universal service responsibilities that continue to be deemed necessary? This is one area where experimentation can work if the states devised targeted assistance mechanisms. But they should not be allowed to impose regulatory restraints or levies on interstate communications to do so.

Agency Power

My third and final "big picture" reform involves what may have been the most glaring omission from the Telecom Act of 1996: The almost complete failure to contain or cut back the size and power of the FCC. Again, we would do well to remember the lessons of the past. When Congress deregulated airlines, trucking and railroads, lawmakers wisely realized that comprehensive and lasting reform was pos-

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[4] See: Adam D. Thierer, "Are 'Dumb Pipe' Mandates Smart Public Policy?: Vertical Integration, 'Net Neutrality,' and the Network Layers Model," *Presentation at Columbia University Institute for Tele-Information conference on Media Concentration and the Internet,* (forthcoming), April 15, 2004; Adam D. Thierer, "Net Neutrality: Digital Discrimination or Regulatory Gamesmanship in Cyberspace?," Cato Institute *Policy Analysis* No. 507, January 9, 2004, *http://www.cato.org/pubs/pas/pa-507es.html*

[5] Adam D. Thierer, "Telecom Newspeak: The Orwellian World of Broadband 'Deregulation'," in Sonia Arrison, ed., *Telecrisis: How Regulation Stifles High-Speed Internet Access,* (San Francisco, CA: Pacific Research Institute, January 2003), pp. 9–31, *http://www.pacificresearch.org/pub/sab/techno/telecrisis.pdf*

[6] Adam D. Thierer. "Federalism and Telecommunications," Federalist Society, 2001, http://www.fed-soc.org/Publications/practicegroupnewsletters/telecommunications/federalism-telecomv3i1.htm; Robert W. Hahn, Anne Layne-Farrar, and Peter Passell, "Federalism and Regulation," *Regulation,* Vol. 26, No. 4, Winter 2003–2004, pp. 46–50, *http://www.cato.org/pubs/regulation/regv26n4/v26n4-7.pdf*

[7] Adam D. Thierer, *The Delicate Balance: Federalism, Interstate Commerce and Economic Freedom in the Information Age,* (Washington, D.C.: The Heritage Foundation, 1999).

[8] See generally: Adam Thierer, "Will 'States' Rights' Derail Telecom Deregulation?" Cato Institute *TechKnowledge* No. 49, March 14, 2003, *http://www.cato.org/tech/tk/030314-tk.html*

sible only if the agencies that oversaw those sectors were also reformed or even eliminated.

In the telecom world, by contrast, the FCC grew bigger and more powerful in the wake of reform and we witnessed spending go up by 37 percent, a tripling of the number of pages in the *FCC Record,* and there were 73 percent more telecom lawyers after the Act than before. It is safe to say that you cannot deregulate an industry by granting regulators more power over that industry.[9]

This too must end. The next cut at a Telecom Act must do more than just hand the FCC vague forbearance language with the suggestion that the agency take steps to voluntarily regulate less. We can't expect the regulators to deregulate themselves.[10] We need clear sunsets on existing FCC powers, especially the infrastructure sharing provisions of the last Act.[11] And then we need to impose sunsets on any new transitional powers we grant them in the next Telecom Act. And we need funding cuts too.

If we fail to do so, we'll likely be sitting here again in 10 years having this same conversation all over again.

Conclusion: Ending "Chicken Little Complex"

In conclusion, it is my hope that Congress rejects the many doomsdayers and naysayers in the telecom sector who claim the sky will fall without incessant regulatory oversight and intervention. "Chicken Little complex" seems to run rampant throughout this sector even though it is less warranted than ever before. We have a chance to make more than just a clean break with the past; we have the chance now to close the book on a regulatory past that has done little to truly benefit consumers.

Regulators have been given over 100 years to conduct a grand experiment with the telecom sector. Why not give markets a chance for once?

Thank you, and I'm happy to take any questions you may have.

The CHAIRMAN. Thank you, Mr. Thierer.

Mr. Ferguson, welcome.

STATEMENT OF DR. CHARLES H. FERGUSON, SENIOR FELLOW, ECONOMIC STUDIES, THE BROOKINGS INSTITUTE

Mr. FERGUSON. Thank you, Mr. Chairman, Members of the Committee. I suspect that we all share in the ultimate goal of having a deregulated and freely competitive advanced digital telecommunications industry, but I'm sure that we differ greatly about how to get there. There are two examples from the history of information technology competition that are quite striking in regard to the current telecommunications case. The first is what happened to IBM when it was a declining monopolist over a 20 year period ending in the mid-1990s, and the second is what happened with the privatization, deregulation, and competitive freedom of the Internet.

While IBM controlled about 70 percent of the world computer market for roughly a 20 year period, it sold the world something like $500 billion worth of computers that were much, much, much too expensive, and that led to enormous economic inefficiencies, and we face something similar in the current situation.

The United States, depending on exactly what numbers you believe, is now approximately 20th worldwide in broadband deployment and is rapidly falling further behind.

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[9] J. Gregory Sidak, "The Failure of Good Intentions: The WorldCom Fraud and the Collapse of American Telecommunications After Deregulation," *Yale Journal of Regulation,* Vol. 20., 2003, pp. 207–267.

[10] Alfred E. Kahn, *Whom the Gods Would Destroy or How Not to Deregulate,* (Washington, D.C.: AEI-Brookings Joint Center for Regulatory Studies, 2001), *http://www.aei-brookings.org/admin/authorpdfs/page.php?id=112*

[11] See generally: Adam D. Thierer and Clyde Wayne Crews, *What's Yours is Mine: Open Access and the Rise of Infrastructure Socialism,* (Washington, D.C.: Cato Institute, 2003), *http://www.catostore.org/index.asp?fa=ProductDetails&pid=1441099*

The CHAIRMAN. It was alleged yesterday we're 11th. Whatever it is, it's bad.

Mr. FERGUSON. It's bad. And it's very clear that it's getting worse. The world growth rate is about 80 percent. U.S. growth rate is about 35, 40 percent, so there's no question that we're falling further behind. And by the way, there are now more DSL lines in absolute terms in China than there are in the United States.

So let me begin with another statement of this problem. Every other digital information technology industry, and I'm going to give you a long boring list: semiconductors, personal computers, disk drives, servers, software, consumer electronics, local area and corporate networking, fiber optics, telecommunications equipment, long distance services. Every other digital information technology and every other industry is advancing technologically somewhere between 40 and 80 percent per year. The price performance of its products and services improves at that rate.

There is one exception in the world and that exception is local telecommunications, including not just broadband services, but also local telephone service and you could even include cable service if you wish, cable video service.

The United States has something like one-third of the world's computers. It only has 14 percent of its DSL lines. There are a lot of statistics here in my written testimony. I'll skip them. I will give one more important statistic. On a price performance basis, broadband service in the United States is about twice as expensive as it is in China, eight times as expensive as it is in South Korea, and about 30 times more expensive than it is in Japan.

The CHAIRMAN. Why is that?

Mr. FERGUSON. That's a very good question and I now will try to answer your question. This has a lot of consequences which I think are enormous and still quite substantially underappreciated for the American economy, and also, by the way, for national security. There are very serious and very real national security concerns associated with this industry related to emergency video conferencing and quarantine and energy supply shocks and so forth.

So why? I would argue that the situation has developed and persisted in some cases because of over regulation, but primarily because the dominant providers of local telecommunication services have successfully, including through regulation and their influence over regulation, have successfully blocked technical progress in broadband services, which progress would undercut the monopoly positions and current revenue bases of local telephone companies, traditional voice and data businesses, and would also eventually threaten the video distribution monopolies of the cable industry. Once you get to about 40, 50 megabits per second, television over the Internet becomes more than acceptable, it becomes in fact superior to cable television.

Yet I fear that Federal policy, particularly I must say, and I apologize if this seems a partisan comment, I don't mean it that way, but particularly under the Bush Administration has been quite ineffective and even counterproductive in dealing with this problem. The industry remains very insufficiently competitive, even in the residential broadband market, which is the market most people talk about when they talk about the broadband market. In

fact, the business broadband market is five times as large in revenue terms and is very important. But even in the residential market, which is the most competitive, most American consumers face at most two options, an incumbent cable company and an incumbent cable company, and about one-third of U.S. consumers face no options at all, or face at most one option, face at best a monopoly situation.

Most other local telecommunications markets, including most of the business broadband market, are dominated by a single telecommunications incumbent, the local telephone company. Remarkably, despite many public statements by the incumbent telephone companies implying that it would be rational for them to enter each other's territories and markets, not a single one of these companies has ever done so. In fact, not a single one of the incumbent telephone companies has ever competed with another one in any market whatsoever worldwide, which is a remarkable situation.

This industry literally spends more money on lobbying, litigation, and paying expert witnesses every year than they do on R&D. They spend something like one-quarter to one-half of one percent per year on R&D, which is vastly lower than any other information technology sector.

There are many signs that this industry is vastly inefficient, and, or perhaps I should say conversely, the nations now leading the world in broadband deployment all share two characteristics, a strong national policy in favor of deployment and enforcement of truly competitive industry conditions based on unbundling and open access to local facilities and local interfaces. Some nations also have subsidies, which however are designed to reward deployment competition and technical progress rather than simply handing money to existing incumbents.

Thus, Mr. Chairman, and Members of the Committee, I must conclude on a somewhat pessimistic note. I think that current Federal telecommunications policy is failing the American people with potentially very serious consequences. Bearing in mind the bad IBM example and the much better Internet example related to the privatization and deregulation of the Internet backbone beginning in 1994, I would recommend the following: the establishment of a national broadband policy with the primary goals of creating a competitive, open architecture industry; eventually providing universal broadband service not primarily through any regulatory mechanism; and providing and having a goal of providing continuous improvements in broadband service that keep pace with the information technology sector.

As a well known man who's now the chief scientist of Intel said, Dave Tannenhouse, putting telecommunications on the technology curve, which it has never been on. Second, true mandatory unbundling of existing telephone and cable television local loops, including the expansion of access rights to all potential providers rather than their being restricted to common carriers as is the case under the 1996 Act.

Subsidies, I think, may be helpful. However, if they are employed, they should be linked to actual broadband deployment and use, not to vague promises or overall financial investment, and they should probably be restricted to services provided by non-dom-

inant carriers. Those could include the incumbents if they enter each other's markets as new competitors.

And I think that it might also be appropriate to consider antitrust investigations directed at the incumbent telephone companies, whose behavior is really quite remarkable for supposedly competitive firms. And then finally, I do agree with some of the comments of the previous witness regarding the need for reform and consolidation of the administrative and regulatory structures of the FCC, the FTC, the DOJ Antitrust Division and so forth. These agencies, my primary complaint would be that they are insufficiently politically independent and that they are very sadly and almost pitifully lacking in high technology expertise. Thank you.

[The prepared statement of Mr. Ferguson follows:]

PREPARED STATEMENT OF DR. CHARLES H. FERGUSON, SENIOR FELLOW, ECONOMIC STUDIES, THE BROOKINGS INSTITUTE

Mr. Chairman, members of the Committee, thank you for the opportunity to discuss U.S. telecommunications policy.

On September 11, 2001, because it was judged unsafe for President Bush to return to Washington, DC, he conferred with his advisors over a secure videoconferencing link, a technology that will be critical to managing future national crises ranging from terrorist attacks to energy supply interruptions. Broadband technology is also critical to economic performance and national welfare. Yet the United States now ranks approximately 20th worldwide in broadband deployment, and is falling further behind. Although this industry is phenomenally complex, the sources of this problem are ultimately quite simple: broadband services are hostage to the self-interest and inefficiency of powerful incumbent firms, and Federal policy has failed to create a modern, competitive, open architecture local broadband industry.

Let me begin with the still under-appreciated importance of broadband services. First, most terrorist threats involve significant transportation disruptions and/or quarantines, with broadband telecommunications required to replace physical transportation during the crisis. Second, videoconferencing and other broadband services are now critical to managing problems such as the cost and quality of health care, maintaining economic growth while limiting pollution and global warming, and surviving any future energy shock related to Mideast politics. And third, broadband services are critical to restoring and maintaining U.S. economic performance in an Internet-driven global economy.

And yet the United States, which invented the Internet and pioneered the commercial Internet revolution ten years ago, is performing exceptionally poorly in broadband deployment, and more generally in local telecommunications services. Every other digital information technology industry—semiconductors, personal computers, disk drives, computer servers, software, consumer electronics, local area and corporate networking, fiberoptics, telecommunications equipment, long distance services—all of these industries deliver to their users exponential improvement in performance per dollar, ranging from 40 percent per year to 75 percent per year. There is, however, one exception: U.S. local telecommunications services, ranging from voice telephone service to broadband service, have displayed low or in some cases even zero or negative rates of improvement over the last decade.

Furthermore, while the United States has one third of the world's computers, it has only 14 percent of the world's DSL lines. As of year-end 2003, the United States had 4.8 DSL lines per 100 telephones, versus for example 5.1 for China, 9.6 for France, 10.9 for Canada, 12.3 for Israel, 14.4 for Japan, and 21.4 for Taiwan. China and Japan both now have more DSL lines than the United States. World broadband deployment is growing 78 percent per year, while U.S. broadband deployment is growing only 35 percent per year. On a price-performance basis, U.S. broadband service is twice as expensive as China, eight times as expensive as South Korea, and thirty times more expensive than in Japan.

This quite stunning situation generates many problems. First, as all information technology becomes more Internet-dependent, all IT products, services, industries, and applications are increasingly hostage to the local broadband bottleneck. This affects the health of the U.S. high technology sector and reduces productivity growth throughout the U.S. economy, perhaps by as much as 1 percent per year. Second,

the high cost and low performance of U.S. broadband services is a driver of outsourcing, causing higher unemployment and downward pressure on U.S. wages, which have now stagnated in real terms for several decades. Third, local broadband costs are now the dominant source of the "digital divide," the growing inequality of information access between wealthy and average Americans. Because computers continuously become more powerful and less expensive, over a five year period broadband costs are now greater than personal computer costs. And fourth, America suffers more than necessary with regard to health care costs, medical accidents, lack of preparedness for terrorist attacks, pollution, and vulnerability to energy price shocks.

This situation has developed and persisted because the dominant providers of local telecommunications have blocked true competition and the development of a modern, open-architecture industry. This is rational on their part: competition and technical progress in broadband services would undercut local telephone companies' traditional voice and data businesses, and threatens the video distribution monopolies of the cable industry. Yet Federal policy, particularly under the Bush Administration, has been ineffective or even counterproductive. As a result, the industry remains insufficiently competitive. In the residential broadband market, only two thirds of users have any choice at all, and even then they face at best a duopoly of one telephone company and one cable provider. These residential broadband services are also designed to impede, rather than promote, Internet telephony, advanced video delivery, and videoconferencing. Most other local telecommunications markets, including much of the business broadband market, are dominated by a single incumbent. And despite many public statements by the incumbent telephone companies implying that it would be rational for them to invade each other's territories, not a single incumbent has ever competed against another, in any market. These companies literally spend more money every year on lobbying, litigation, and expert witnesses than they do on R&D.

However, the nations now leading the world in broadband deployment all share two characteristics: a strong national policy, and enforcement of truly competitive industry conditions based on unbundling and open access to local facilities. Some nations also have subsidies, which however are designed to reward deployment, competition, and technical progress, rather than simply handing money to inefficient incumbents.

Thus, Mr. Chairman, and members of the Committee, I must conclude on a pessimistic note. In regard to telecommunications policy, Federal policy is failing the American people, with serious consequences. To remedy this problem, I would recommend the following:

1. A national broadband policy with the primary goals of establishing a competitive, open architecture industry; providing universal broadband service; and providing continuous improvements that keep pace with the information technology sector.
2. True mandatory unbundling of existing telephone and cable television local loops, including open-architecture access points analogous to those used in the Internet. Access rights should be expanded to all potential providers, rather than being restricted to common carriers as is the case under the 1996 Act.
3. Subsidies may be helpful. However, they must be linked to actual broadband use, and possibly restricted to services provided by non-dominant carriers. For example, a subsidy for each unbundled loop used for new broadband service, in exchange for low loop resale rates, would potentially be helpful.
4. Antitrust investigations and actions directed at the incumbent telephone firms should be seriously considered.
5. Reform of the FCC, DOJ antitrust division, and other Federal regulatory systems to improve the political independence, efficiency, and high technology expertise of Federal regulation and policymaking.

For those interested in much further detail, and possibly also something to put them to sleep, Brookings Press has just published my book, *The Broadband Problem.* Thank you.

ATTACHMENT

Selected Broadband Deployment Data

Source: www.dslforum.org

Global Ranking 31 December 2003	Country	DSL Subscribers 31 December 2003	Telephone lines 2001/02 (ITU)	DSL per 100 phone lines 31 December 2003
1	South Korea	6,435,955	23,257,000	27.7
2	Taiwan	2,800,000	13,099,416	21.4
3	Hong Kong	690,000	3,842,943	18.0
4	Belgium	789,677	5,132,427	15.4
5	Japan	10,272,052	71,149,000	14.4
6	Denmark	473,481	3,739,247	12.7
7	Singapore	242,000	1,927,200	12.6
8	Israel	380,000	3,100,000	12.3
9	Finland	336,600	2,850,000	11.8
10	Canada	2,170,243	19,962,072	10.9

USA: 4.8 DSL lines per 100 phones, less than half of Canada, which is #10; even China is already ahead of the U.S., w/5.1 DSL lines per 100 phones, & its DSL use is growing much faster (over 300 percent per year); As a result, by year-end 2003 China and Japan already had more DSL lines in absolute terms than the U.S., which is now #3.

USA falling further behind: 35–40 percent U.S. annual DSL growth rate vs. 78 percent world growth rate; U.S. will soon be far behind several nations even in absolute terms (*e.g.,* China, Japan, Korea); see national rankings by total DSL lines as of 12/31/03:

Global Ranking	Country	DSL Subscribers 31 December 2003	DSL per 100 phone lines 31 December 2003
1	China	10,950,000	5.1
2	Japan	10,272,052	14.4
3	USA	9,119,000	4.8
4	South Korea	6,435,955	27.7
5	Germany	4,500,000	8.4
6	France	3,262,700	9.6
7	Taiwan	2,800,000	21.4
8	Italy	2,280,000	8.3
9	Canada	2,170,243	10.9
10	UK	1,820,230	5.2

The CHAIRMAN. Thank you, Mr. Ferguson.
Welcome, Mr. Gilder.

STATEMENT OF GEORGE GILDER, SENIOR FELLOW, TECHNOLOGY AND DEMOCRACY PROJECT, DISCOVERY INSTITUTE

Mr. GILDER. Thank you for having me here, Mr. Chairman.

The CHAIRMAN. Can you pull the microphone over in front of you so that the stenographer can—thank you.

Mr. GILDER. The first rule of holes is that when you're in one you stop digging, and——

The CHAIRMAN. That applies to a lot of places in the world today.

Mr. GILDER. It does. And today Federal regulators, local, state regulators, courts, have all dug a huge pit, a canyon from which America's telecom can't even see what's going on in the rest of the world. And since 1996, fiber optics technology has improved about 11,000-fold, and the capacity of fiber optic technology has improved far faster than microchips or anything else. It has been the spearhead of world technological advance and across the optics range. Internet traffic has increased about 9,000fold since 1996.

But in the midst of this tide of telecom progress, we've had a catastrophe, just a disaster inflicted by multiple sclerosis of regulation and hundreds of bodies across 50 states in more than 100 jurisdictions, just an incredible maze of litigation has been created, which has effectively privatized the risks of telecom investment and socialized the profits and returns to it. And the result has been a 1,000 bankruptcies, a million people jobless in telecom, $2 trillion of lost market cap, and the United States fallen desperately behind, a lot further behind than previous testimony has indicated. Korea now has 40 times more per capita bandwidth to homes and businesses, 40 times. Japan has between 10 and 20 times. Italy has 4 times.

By world standards, the U.S. has no broadband at all. Stop talking about the big success of broadband. You're talking about average transmission rates that are one-twentieth to one-fiftieth of the rates that a real broadband in Japan and Korea and other countries. But the U.S. does reign supreme in one key telecom area, and that's the communications bar. We've got more lawyers than any other country in the world by far devoted to this maze of litigation——

The CHAIRMAN. And wouldn't you include lobbyists in that group?

Mr. GILDER. Lobbyists too. They're called forth by the mazes of regulation. You don't have the whole industry focused in Washington unless Washington's doing something very bad. That's why they come. Unless you stop this aggressive, pervasive regulation and litigation, you can't accommodate an industry that's improving its cost-effectiveness 11,000-fold in 6 years, where every part of the industry is advancing at a tremendous pace and accept the law, which still doesn't even come to terms with the existence of the Internet.

And so if there's anything in the world that's interstate commerce, it's telecom, and the states and localities should have no role in telecom litigation. Preempt the states and localities. They

just cause confusion and paralysis and I don't know what kind of bennies you're got to give to them to do that, but they've got to be preempted in telecom law.

And resist new frameworks of regulation. All sorts of sophisticated people are coming forth with ideas of layering and sort of, which Adam correctly described as enshrining the past in the name of progress. There are all sorts of valuable vertical integration going on across all those companies that Charles listed, and that must be permitted. You can't modularize, prematurely modularize all the connections across the country. That just recreates a new paralysis.

And keep the laws clear, simple, bright lines. That's absolutely essential to long-term investment, massive long-term investment that is needed in this spearhead of global economic progress.

In summary, I do not want an industrial policy. I want an end to the anti-industrial policy that prevails in the United States where we subsidize ethanol but punish U.S. telecom with higher taxes than any other industry except tobacco and alcohol.

Thank you very much.

[The prepared statement of Mr. Gilder follows:]

PREPARED STATEMENT OF GEORGE GILDER, SENIOR FELLOW, TECHNOLOGY AND DEMOCRACY PROJECT, DISCOVERY INSTITUTE

Mr. Chairman and Senator Hollings, thank you for the opportunity to appear before your committee today. Your selected topic is crucial to the well-being of the U.S. and global economies, and I appreciate your deep interest in the subject.

Overthrowing matter and media with the new worldwide web of glass and light and air should be a happy and defining event in the history of man. Global information networks offer unprecedented potential opportunities for economic growth, cultural revival, and individual freedom and empowerment. Yet the United States has in large part blocked the path of the technologies and companies needed to consummate this vast new infrastructure of chips, fiber optics, antennae, digital storage, and software.

Although American companies invented almost all the technologies crucial to the Internet, we have fallen behind many other nations in the deployment of these technologies. The U.S. now ranks eleventh internationally in residential "broadband" access. Using the FCC's silly 200-kilobit-per-second definition, some now say that 25 percent of American homes have broadband. But by the standards of Asia—where most citizens enjoy access speeds 10 times faster than our fastest links—U.S. residences have no broadband at all. U.S. businesses have far less broadband than South Korean residences. South Korea, for instance, has 40 times the per capita bandwidth of the U.S. Japan is close behind Korea, and countries from China to Italy are removing obstacles to the deployment of VDSL, fiber-to-the-home, and broadband wireless networks.

Asian broadband also proves there was no Internet "bubble." Today, Korea runs over the net between a three and five times larger share of its economy than we do. Riding the bus to work, Koreans watch television news and exchange video mail over their mobile phones. They enjoy full-motion video education and entertainment in their homes. Many of the dot-coms that failed in America due to the lack of robust broadband links are thriving in Korea. Consider that by this time next year Verizon Wireless's 38 million customers will enjoy faster Internet access via their mobile phones than through their Verizon DSL connections to their homes. Only the most severe disincentives to invest could have yielded such a result, which defies the laws of physics. The American Internet "bubble" was actually a crisis of policy.

The Telecom Act of 1996 was meant to "deregulate" America's telecom infrastructure and technologies, the most dynamic sectors in the entire world economy. But after the usual lobbying and horse-trading, the Act turned into a million-word *re-regulation* of the industry. Regulatory actions by the FCC and the 51 state utility commissions greatly exacerbated the bad parts of the Act and distorted many of the good parts. As I predicted the day after it was enacted, the result was a carnival of lawyers, micro-*mis*-management by bureaucrats, price controls, the socialization

of infrastructure, the screeching halt of innovation and investment in the "last-mile" local loop—and the Great Telecom and Technology Crash of 2000–2003.

In the last year or so, the FCC has partially reversed some of its most egregious errors. Some are still being adjudicated in the courts. But U.S. telecom remains a highly regulated, highly taxed sector of our economy. The mistakes of the last 10 years have greatly harmed the U.S. economy, and continued gridlock and inaction threaten to shift American leadership in technology to Asia, which has embraced the Internet with open arms.

Today, just as the telecom and technology sectors exit a three-year depression, we are in danger of repeating the very worst mistakes of the 1996 Telecom Act, but this time on an even grander scale. In today's testimony I will address and refute one particular proposal that is being offered as the basis for the new telecom legislation. In doing so I hope also to offer an alternative vision.

The new "big idea" in telecom regulation comes from a host of learned and experienced telecom thinkers: the likes of former FCC authority Kevin Werbach, Stanford law professor and technology author Lawrence Lessig, industry analyst Roxanne Googin, and IPioneer Vint Cerf, to name just a few. The idea is mandated "open access" to the logical layers of the network, and it is embodied in a new legislative proposal by MCI, "A Horizontal Leap Forward: Formulating a New Public Policy Framework Based on the Network Layers Model."[1] A horizontal layers approach would supposedly be a radical shift from the "vertical silos" approach now used, where telephony, cable, and wireless, for example, are regulated based on historical industry definitions, not generic functional categories. The common denominator of Internet Protocol (IP)—supposedly the basis for all future communications networks—is said to necessitate the new layered regulatory approach.

Barely recovering from the FCC's TELRIC and UNE–P "open access" mandates that chopped up and assigned ownership rights to the physical infrastructure—the hardware—of the Net, we now face the prospect of rigid reassignment of content, applications, services, and protocols, too. Whatever it is called, it represents more micromanagement of a dynamic industry in the midst of major technological transitions.

The new proposal feeds on fear—fears that cable TV companies or the Bells might seek to leverage their broadband networks by wrapping content into their conduits, or that Microsoft might keep "tying" new applications into Windows, or that Google might monopolize information on the Net (yes, there is already an organized effort to turn Google into a public utility). MCI's layering proposal defines rigid boundaries between content (voice, text, video), applications (e-mail, browsers, VoIP), protocols (TCP/IP, HTTP, FTP), and infrastructure (wires, switches, spectrum, PCs, handsets). In a paper entitled "Codifying the Network Layers Model,"[2] MCI proposes to "quarantine" major providers of one of the layers within that layer, and to prohibit them from vertically integrating into another layer unless they offer wholesale open access to all competitors. Lessig, MCI, and company worry that the "end-to-end" nature of the Internet—where any terminal attached to the net can be reached from any other terminal—will be threatened if these new layering rules are not adopted.

Layering proponents, however, make a fundamental error. They ignore ever changing trade-offs between integration and modularization that are among the most profound and strategic decisions any company in any industry makes. They disavow Harvard Business professor Clayton Christensen's theorems that dictate when modularization, or "layering," is advisable, and when integration is far more likely to yield success. For example, the separation of content and conduit—the notion that bandwidth providers should focus on delivering robust, high-speed connections while allowing hundreds of millions of professionals and amateurs to supply the content—is often a sound strategy. We have supported it from the beginning. But leading edge undershoot products (ones that are not yet good enough for the demands of the marketplace) like video-conferencing often require integration.

Metaphors from the Telecosm help explain the fluid nature of these layers that MCI wants to preserve in concrete. Consider Corvis, our favorite optical equipment company and national fiber optic bandwidth provider. It blows apart the MCI approach on several fronts. First is CEO David Huber's architecture of an all-optical network, devoid of electronic regenerators and protocol readers, which unites con-

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[1] Whitt, Richard S. "A Horizontal Leap Forward: Formulating A New Public Policy Framework Based On The Network Layers Model." An MCI Public Policy Paper. March 2004. *http://global.mci.com/about/publicpolicy/presentations/horizontallayerswhitepaper.pdf*

[2] Whitt, Richard S. "Codifying the Network Layers Model: MCI's Proposal for New Federal Legislation Reforming U.S. Communications Law." March 2004. *http://global.mci.com/about/publicpolicy/presentations/layersmodelfederallegislation.pdf*

tent and conduit by using colors of light both to bear the message and to determine the path of the circuit. It radically collapses the top layers of the OSI (Open Systems Interconnection) stack used in the Sonet voice and data networks of the past, not so much redefining the interfaces as transcending them. A "switchless" web of always-on fixed lambdas (wavelengths of light) can function as both the physical and logical layers of the Net because the intelligence is embedded in the path. There will be some controlling devices at the edge of the network, and IP will still be widely used, but the heyday of IP packet switched networks may well be over. Typically government enshrines the past in the name of progress. In uniting Corvis, a cutting edge equipment provider, with Broadwing, an infrastructure builder and service provider, Huber is also betting that IP networks are not inherently modular, where equipment from a thousand providers can easily be cobbled together to deliver high-bandwidth, low-latency services, but that networks are still in fact in an era of undershoot where an integrated provider can deliver a superior product at a much lower cost.

Our favorite digital chip company, EZchip, also explodes the idea that the layers of the Net can always be defined and "quarantined." Where until now data flowing through the seven layers and numerous sub-layers were parsed and modified by a gaggle of hundreds of chips connected by thousands of wires and glue-logic galore, EZ puts all seven layers of the OSI stack onto one chip, performing all the essential functions of an Internet router on a single sliver of silicon. The "layers" are once again transcended when EZ's software tools allow programmers to tell the chip what to do without even referring to the rigid layers, channelizations, protocols, and interfaces used in the previous software environment. Is this fair? Should EZchip be allowed to invade someone else's turf, perhaps that of Cypress's high-end content addressable memories (CAMs) or Broadcom's Silicon Spice communications processors or the sacred code of the OSI idol? Or to blow apart someone's whole field, like EZ could one day do to the many providers of communications ASICs (applications specific integrated circuits), or to Internet router king Cisco itself?

It might be said that the "layering" proposals now in circulation are yet another (if more clever) attempt by competitors to target the Bell telephone and cable TV companies. Indeed, MCI's own paper implies the cable companies (bundling network, ISP, and content) and the Bells (bundling network, ISP, and voice) are already stomping all over the layers, creating a muddy (and hopefully one day illegal!) mishmash of vertical integration. What a coincidence that the activities of its rivals violate MCI's framework and cry out for cleansing and re-ordering (read structural separation, consent decrees, price controls, divestiture) by new teams of FCC horizontalawyers and IPolice.

But if the proposals are meant as anything more than political lobbygagging of rivals, if the proponents really mean their model legislation as a principled, generic set of rules, then we must consider the logical consequences of such new laws. If applied dispassionately, how would such general rules affect the rest of the Internet, communications, and technology industries?

Should Google be able to leverage search into Gmail, or to supply content using its proprietary algorithms and its physical network of 100,000 servers? Shouldn't any rival search provider be able to feed off of Google's advanced infrastructure? After all, wouldn't it be impossible to recreate Google's massive web of global intelligence? Doesn't Google's superior infrastructure exhibit "market power"? Might Google actually evolve into a general provider of web-based information management services, rivaling the PC-based Microsoft, or should Google be "quarantined" as a search provider? Or maybe we should structurally separate Google into three companies: an infrastructure provider (its 100,000 networked servers plus algorithmic IP), a content/advertising company, and an information services company (Gmail plus future knowledge management applications). Surely FCC bureaucrats can make these easy distinctions and explain the resulting penalties to weary entrepreneurs who have just spent 10 years of their life building a new service that people really like.

Should Sony be able to demand that its PlayStation gamers get access to Microsoft's Xbox Live online video game network? Should Amazon be able to aggregate and make searchable the text of hundreds of thousands of books? Should Sprint PCS or Verizon Wireless be allowed to develop specialized content delivery platforms or applications that take advantage of their superior wireless data networks? Sprint was the first to build its own photo-sharing platform, and it is apparently the most user-friendly wireless photo-sharing system. Can we let such infrastructure-leveraging stand?

What if Equinix (the data center company that almost defines of the integration of the physical, protocol, application, and content layers of the Net) succeeds in becoming the overwhelming meeting place (peering point) for the world's network, e-

commerce, and content providers? Network economics suggest the concentration of all the largest Internet players in Equinix facilities is possible, or even likely. If Equinix achieves such "market power," are we to assume that other "virtual data centers," like the CLECs before them, could force Equinix to "open up" its hosting facilities so that the new virtual competitors can offer services over infrastructure they did not build? Why should anyone build risky and expensive new infrastructure if it can be readily used by competitors.

What about Microsoft integrating easy-to-use voice-over-IP software into its next operating system? Should Microsoft rival Real Networks be barred from aggregating music and video for download with its RealPlayer multimedia suite? All of these are, to one degree or another, inter-layer integrated products and services.

Proponents of "layering, or "Net neutrality," or a free Internet "commons," assume there is one network, that it is sufficient and timeless, that no new networks are possible or needed. They want innovation on the edge, in the form of software apps and Wi-Fi attachments. Innovation in the core is either assumed or ignored. The logical conclusion, however, is that since the "best network"—the free commons—cannot make any money, there will be no network. And just how much innovation at the edge will there be if there is no innovation—no bandwidth—in the core?

MCI's "horizontal leap" asks authorities to pursue vigilantly those who would exploit "network choke points" or take advantage of "network effects." In industries where "entities seek to obtain market power" (*i.e.,* seek to make money in a business enterprise), policymakers need to ensure four things: "open architecture, open access, universal access, and flexible access." When imposed by regulators or courts in a national capital, these four euphemisms boil down to one hard reality: socialization and micromanagement of the "architectures" and "access" networks built by others.

The ability to tie and merge and break apart and outsource products, services, and technologies are the very stuff of business. As is the ability to pursue an unguaranteed return on one's risky investment. As is the decision how to price these products and services. Some services will be bundled. Some will be free, loss leaders to leverage the purchase at another point of sale. But the entire system cannot be free. Everybody else's product or service, except one's own, cannot be a commodity, barred from bundling or profit.

The companies that enable this broadband world will be able to charge for it during the years that they provide the optimal service. Their initial margins will be high. When communications becomes a commodity, as it eventually will, the margins will drop. This is not a catastrophe. No one has a right to high margins for a commodity service. But the Telecosm is still an arena of innovators, such as Corvis, EZChip, Qualcomm, Verizon Wireless, Essex, AFCI, Agilent, and hundreds of others, who will enjoy large monopoly rents until their inventions are standardized and commoditized and the leading edge moves elsewhere.

The telecom industry is nowhere near some mythical paradox of perfection or cul de sac bargain basement of commoditization. It is still engaged in a thrilling adventure of putting together worldwide webs of glass and light that reach from your doorstep or teleputer to every other person and machine on the planet. It is long distance and it is local, it is packetted and circuited, it is multithreaded and aggregated, it is broadband and narrowcast, all at once. These crystal palaces of light and air will be hard to do and the world will reward the pioneers who manage to build them. The real threat to monopolize and paralyze the Internet is not the communications industry and its suppliers, but the premature modularizers and commoditizers, the proponents of the dream of some final government solution for the uncertainties of all life and commerce.

The CHAIRMAN. Mr. Gilder is always not only informative but also entertaining, and I thank you for your straightforward remarks, and frankly, I wish many Americans could hear your comments today.

Mr. Hundt, it's a pleasure to have you before the Committee again. We've enjoyed a long relationship with you as our former Chairman of the FCC. We appreciate all the great work you've done and it's nice to have you back before the Committee today.

STATEMENT OF REED E. HUNDT, FORMER CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION

Mr. HUNDT. It's very much of an honor to be back before you, Mr. Chairman, and your colleagues, and it's also a pleasure to see you all. I do feel a little guilty because not only am I lawyer but I'm a son of a lawyer, and how could I not feel bad about that after hearing the catastrophe that the rule of law has inflicted on this sector? But I'm particularly delighted not to be invited here as a ghost of FCC past, but rather to be able to talk about the future. And I would with great respect like to urge you in my opening brief remarks to take four steps, and to be perfectly honest, you could take them pretty much today, meaning they do not require that you begin what we all know, because we know the rule of law, we all know is like it or not the long slog to an overhaul of a law.

Not only are the four steps I'm going to talk about today some things that could be done quite immediately, but astonishingly they are unbelievably important to the future of broadband. They are four steps that relate to the future of wireless broadband particularly. The great lexicographer, Dr. Johnson, said that men usually agree on ends but disagree on means, and there are many, many debates to be held about means that could be boiled down to, do you trust the market or do you think it needs a little subsidy, do you want to regulate or do you want to deregulate. And I'm here to say that those issues are not necessary to be decided or those battles are not necessary to be fought on those terms in order to do what is incredibly important to do with respect to wireless broadband.

In a political season and an election year, particularly in a Presidential election year, everyone on this Committee knows better than anyone else that if you can find a blessed island of agreement where cool reason can have a place, you don't get to stay there for long, but it's nice to enjoy it. This is a blessed island of agreement. We all note that the President of the United States 2 days ago said that by 2007 we should have universal broadband. Senator Kerry has said the same thing. Universal in our country is a practical matter, it means somewhere around 95 or 90 percent because you can never get the last 5 percent to agree on anything and that's OK.

And we all know this. The one sure, certain way to get to these extraordinarily high penetrations is to improve the quality and lower the price of whatever it is you're talking about, improve the quality and lower the price. So we have universal VCRs because the government didn't have to do anything, we let innovation lower the price and we let the industry work out ways for them to be compatible with the existing television industry.

That's what can happen with wireless broadband. If this Committee takes these four steps, we can lower the cost and have that translated to lower cost and we can improve the quality of wireless broadband. I'm not talking about 3G cellular, the handheld devices with the new technologies that run off the bay stations. They're primarily about voice with a little bit of short messages. That's not what I'm talking about. I'm talking by wireless broadband about a chip set about as big as my thumbnail that you can grab today, you'll have to get some pretty good glasses on to see its workings,

but you can see it today. That chip set will send out a radio signal to a box about as big as a cheeseburger, I'm doing the South Beach Diet, so everything seems to me about as big as a cheeseburger, but this box is about as big as a cheeseburger and it sits on a windowsill. Its price is going to be less than $100 within weeks. It may be less than $100 if I buy it on E-bay, and then the signal goes from there to an antenna in a bread box, only food analogies, that needs to hang on a lamp pole or a street lamp or a telephone pool, something like that.

The prices for these boxes also are going way down. We're talking about a radio signal from a chip that can be in a laptop or a TV set top box or a refrigerator or anything, George can tell us all the possibilities, go from that signal to boxes that hop across the air, and ultimately miles away get to a fiber optic cable and become part of the Internet. No digging, no huge networks that have to be built before there are users, incredible ability to take advantage of all the cost efficiencies.

What are the hurdles? Wireless broadband is being designed as we speak. There are trials in have a dozen cities. I mentioned the names in my testimony. You can go around, kick the tires. It's all being put in the wrong spectrum. It's all being designed for spectrum where the radio frequencies are very, very high, and as a result, the radio waves themselves do not penetrate buildings. We did not put broadcast TV in that spectrum because we wanted people to have TV sets inside houses, not to have to put them out on their lawns in Montana where it might be too cold. So we a long time ago put broadcast TV in the spectrum that you need to have a high quality of service, and this is the most important part, a very, very low cost, because if you have the right radio frequencies, you don't need as many boxes and you can design it better. And I've attached a chart to my testimony, we can lower overall the cost of wireless broadband in one fell swoop by 50 percent within months if this committee will say to the whole wireless broadband industry, we need to be designing in the spectrum that today is occupied by analog UHF channels.

That's what we need to do, not just right away, but we need to do it for the future. We'll lower the cost, we'll add tens of millions of people, not because we threw money at the problem, but because we let innovation lower the cost of the problem.

What are the four steps? These are the following four. Number one, you recall, Mr. Chairman, the debate years ago about 85 percent penetration being the threshold for when we could begin to allow new data and broadband uses for the UHF channels. If the FCC is encouraged by this Committee, it only needs encouragement, to cast three votes for a sensible interpretation of the 85 percent in which you count everyone that now receives a satellite signal that is digital and now receives a cable signal that is digital, if you allow them to count that as 85 percent, then we've already hit the threshold, and you can take the very high UHF channels that literally we are down to only a few 100,000 people in the country who are watching them over the air as opposed to on cable and satellite.

You can tomorrow say that that spectrum is available for wireless broadband, take out 50 percent of the cost, greatly improve the

quality of service, and allow new wireless broadband technologies to be marketed by the market, by cable, by telephone companies, by new startups, by long-distance companies, by Gilder Inc., anyone who wants to go in this business. That's step one. They just need to count it right.

Step two, the FCC needs to be told that, for example, if I might, in Senator Burns' state, where there is spectrum allocated to broadcasters, but no one is using it, because when you go out with a measuring device, you'll see that there are no signals because of the tremendous open spaces, allow what's called a secondary use that by law must not be permitted to conflict or interfere with any TV. That would be true in any state other than in a high density metropolitan area. That would be possible today. That's just a stroke of a pen at the FCC. It's not a big rewrite of the law.

Third, they need to immediately proceed with respect to all the spectrum that will ultimately be retrieved. They need at the FCC to issue an order immediately that says this will be used by wireless broadband, some will be licensed, some will be unlicensed, some will be auction. They need to decide today what the plan is and promulgate it so that the engineers know what they're designing for. And that can be done today.

And last, and it's absolutely not least, the FCC needs to be urged by this Committee to do the following, to say to the localities, to municipalities, these poles, these telephone poles, these street lamps, these public buildings, you have to let people put these bread boxes about this big on top of them.

That's all. We're not talking about saying that they have to provide electricity. We're not talking about saying that they don't get to charge what's called a make-ready cost. They can charge that. We're just saying they have to allow it. They can't get bogged down in their own bureaucracies and say 3 or 4 years from now we'll let you know whether or not you can build those networks.

These four steps, if this Committee could get everybody to sign the letter bipartisanally, because I don't think there's a Republican-Democrat, left-right division on these topics, if you all could just say, these are the four steps, and FCC, if you've had trouble getting three votes for things, we want you to have five votes for these four steps. You will totally transform the future of wireless broadband, completely transform all of the penetration rates. Everybody on this panel will be talking about how we're going to be growing at the 60, 80 percent rate instead of the current rate.

Thank you very, very much.

[The prepared statement of Mr. Hundt follows:]

PREPARED STATEMENT OF REED E. HUNDT, FORMER CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION

Mr. Chairman and Members of the Committee:

Thank you for inviting me to testify today on the future of this country's telecommunications industry. I am grateful for the opportunity to present my views. My testimony today reflects only my personal views, and not the views of any company with which I am associated. (Such associations are in the summary resumé attached hereto.)

As you know, the only right economic policy for a nation is to seek to obtain a high and rising standard of living. Social policies may be aimed at other goals, but that is the purpose of an economic policy. To do that, productivity gains and full

employment are both necessary. The conundrum of telecommunications is that it has contributed more than any other single sector to overall productivity gains, but in the process many of the telecommunications jobs of the past have become unnecessary. At the same time many new jobs, particularly in wireless and Internet companies, have been created.

The challenge for this Committee is how to foster both continued productivity gains and job growth in our whole economy by means of establishing a particular legal regime for the communications sector. Would we have more or less overall productivity gains if we had an unregulated communications monopoly, a rate-regulated communications monopoly, a set of competing firms that shared certain essential facilities, a contribution of public funds to make up for market failures, or a way to capture such externalities as network effects? All these questions must be asked anew very often and we can expect that answers will evolve over time. I honor and thank this Committee for engaging in this process of continued reassessment of the right answers to these questions, and indeed continued efforts to determine the right questions.

Technology creates potential; in a capitalist society economics is the science by which we describe how the potential of technology is translated into the actuality of the marketplace. But the culture of a country ultimately determines the shape and function of the marketplace's outcomes. That culture is composed of many things, but one key element is the rule of law.

Today we look back at the era of regulated monopoly in telecommunications and conclude that its advantages in terms of efficiency were ultimately outweighed by the cost of regulation and the discouragement of productivity enhancing innovation that was an inevitable corollary of monopoly. For the better part of30 years the United States, acting often through this committee, has led the world in replacing the paradigm of regulated monopoly with a new framework of competition coupled with certain key elements of legal obligation placed on the owners of bottlenecks or essential facilities. This new framework is the grand outline of the 1996 Telecommunications Act and the 1997 World Trade Organization telecommunications treaty. It is the outline of the rules of law being put in place in more than 90 countries around the world. It is the outline of the rule of law that is helping such huge new economies as China and India take the place that the size and work ethic of their populations should earn them on the global stage, barring such dreadful catastrophes as war or the reversion to communism.

We should take a look at some of the outcomes of this new paradigm here in the United States. The telecommunications industry since 1996 has experienced unprecedented growth and American consumers and businesses today enjoy the widest array of services at the lowest prices in American history. The industry itself-like its related computer hardware and software industries—consists both of firms that have done better and those that have done worse over the last 8 years. In our system, we do not regard an economic policy as a failure if one or more firms fail in fair marketplace competition. We do regard that policy as a failure if it does not contribute to productivity gains and therefore to a high and rising standard of living for all Americans.

While industry gross revenues are not the only metric by which we should judge the success of a policy, they are relevant. Industry revenues, both overall and by segment (with one exception) have increased tremendously since passage of the 1996 Act. By my current calculations, based on data drawn from several different sources, total sector revenues grew at a compound annual rate of almost 7 percent between 1997 and 2002, increasing from $266 billion to $371 billion. That growth rate substantially exceeds the growth rate of the overall economy for those years. And that revenue growth has come in conjunction with falling prices.

Moreover, these impressive gains are dwarfed by the performance of particularly innovative service segments. Demand for wireless services simply exploded-growing from $30 billion in 1997 to $78 billion in 2002, an annual average compounded rate of more than 20 percent. Mobile services are so cheap on a price per minute basis, because of competition and innovation, that cellular customers here purchase nearly twice as many minutes per month as they do in Europe. The result of the growth of wireless voice is that revenues in this segment will exceed revenues from local wire-based voice in the next couple of years, even though local voice revenues have gone up about 5 percent on a compound annual basis since 1996.

Another tremendous growth story is that Internet access revenues increased annually by more than 25 percent, from a modest $7 billion in 1997 to $24 billion in 2002. E-commerce firms have greatly increased in market capitalization as a result of greater Internet access.

You might also be interested in knowing that contrary to many media reports, returns on dot.com investment have been positive since 1997, averaging about 10 per-

cent compounded annually, according to a study by Professor Tom Eisenmann of the Harvard Business School. More generally, telecommunications capital expenditure in 2005 will be higher than in 1997, although the trend now is downward unless and until new technologies are deployed.

It follows that if revenues are up, then consumer spending by both business and residential consumers on telecommunications services during this period similarly grew strongly. Retail spending by business customers increased from $101 billion in 1997 to $141 billion in 2002 and consumer spending rose from $121 billion in 1997 to $172 billion in 2002. Yet, for almost all communications services the prices have gone steadily down.

In short, consumers have spent more because they have been offered lower prices for similar services and attractive prices for new services. Whole new markets have been created, especially in wireless and Internet markets.

An exception to this amazing story of economic expansion is the wireline long distance business. Revenues in that industry segment declined, in absolute terms, from $76 billion in 1997 to $55 billion in 2002.

Congress in 1995 was rightfully concerned about the potential for such a downturn in the long distance business. Prices have gone down because of technology innovations that lowered fundamental costs, the actions of the FCC to lower steadily the contribution to cost of the interstate access charge, and the proliferation of competition from both Bells on the fixed line side and the wireless firms offering wireless long distance. Prices have gone down so much that they have outstripped the willingness of consumers to pay more for long distance-elasticity effects did not make up for the price drop and so total revenues are down. The result is that firms depending on long distance revenue have found that it is increasingly difficult to compete in telecommunications. By contrast, those depending chiefly on local voice or cable revenues have had their own challenges, but faced them with a more reliable revenue stream at their disposal.

The Members of this Committee in particular were keenly aware that the traditional long distance carriers like AT&T and MCI would be hard-pressed to offset their losses in toll revenues with revenues from local voice markets. Those carriers, even armed with the market-opening tools Congress provided in the 1996 Act, faced formidable barriers to entering local Bell markets. Generally they have been unable to obtain new revenues in any new market fast enough to overcome the loss of revenues in long distance. This was one of the possible outcomes of the 1996 Act.

I want to step around debate about the troubling role of the extraordinarily prolonged judicial review of the 1996 Act in producing this outcome. Although the judiciary collectively has not acted with clarity or alacrity, competition's benefits have been obtained to a large, if imperfect, degree. Under a competition paradigm the key goals are and ought to be productivity gains, as well as lower prices. These goals necessarily can be achieved only by reducing regulated costs and by promoting innovation. By and large the communications sector has never seen so much in the way of innovation, productivity gains, lower prices and higher revenue as it has seen in the 8 years since the 1996 Act was passed. That is somewhat a function of the wisdom of the law, somewhat a function of technological change and somewhat a function of the effective strategies of various firms.

What then comes next?

As matters now sit, the American telecommunications industry will continue to experience steady growth in wireless, Internet, and traditional voice services, both local and long distance. For the voice business, the pace of growth will not resemble what we have witnessed in the years since passage of the 1996 Act. But the one industry segment that has the potential to re-ignite the engine of economic growth that drove the Nation's economy in the late 1990s is broadband services.

This has been and ought to continue to be a subject of Committee attention for three principal reasons. First, measured by the scale of broadband (meaning the percentage of households subscribing), the scope of broadband (meaning the range of bandwidth speeds and proffered services), and the price of broadband, the United States does worse than important rival nations. Second, broadband has the potential to generate very large new productivity gains, and to create many hundreds of thousands, and ultimately millions, of new jobs here in the United States. Third, we are on the verge of a new technological breakthrough that can be brought more quickly and efficiently into the marketplace if the government takes timely and effective and comparatively minimal action: I refer to wireless broadband and to the wisdom of letting it flourish at frequencies on the spectrum chart that will in any event be vacated soon.

If this Committee now can lay out a path for virtually immediate use of a modest amount of spectrum on the frequency chart below one gigahertz, then wireless broadband will be a much cheaper and easier and more valuable service for access-

ing the Internet, making a voice call, sending and receiving video, providing health care, education, job training, and universal service. It can be not just a universal service, but a universal solvent that can dissolve many of the roadblocks to innovation and deregulation in communications markets. With an effective spectrum allocation for wireless broadband at the frequencies that permit signals to reach inside buildings, we will in just one or two years be able to commence a step by step process that will achieve fairly soon the complete deregulation of retail prices in communications, among many other long desired goals of the 96 Act.

Let's start with how the United States lags woefully behind many other countries, especially South Korea, in broadband penetration. See pages 20–22 for charts. Our broadband is Little Broadband, about one megabit per second, whereas in Korea and Japan very large percentages of the population can buy Big Broadband, meaning up to 8 megabits per second. Their services are priced lower: their users get up to 10 times the bandwidth for the buck. Their household penetration is much higher: South Korea's penetration is about three times higher than America's, measured by percentages of households.

The rapid penetration of broadband in South Korea and other Asian markets is not a coincidence. Particularly in Japan and South Korea, the national governments played key roles in promoting the build-out of a truly broadband network. In Korea, for example, the government provided $1.5 billion in subsidies to finance the build-out of a broadband network backbone and an additional $1 billion in low-interest loans to operators for the construction of last-mile links.

In addition, both South Korea and Japan implemented policies that were designed to foster vibrant competition between providers of broadband services. Japan, for example, required incumbent carriers to make available access to their dark-fiber facilities as well as copper loops. Japan also adopted regulatory directives to prevent the dominant incumbent provider of local voice service from deterring the entry of new providers.

South Korea's approximately 70 percent penetration is the product of a number of different factors, including favorable demographics and strong consumer interest. But, it would be mistaken to understate the importance of government policy in making Korea by far the largest user of broadband services in the world. The South Korean government, for instance, sponsored programs to encourage the purchase of personal computers, including low-interest loans, and to encourage the schools and government to obtain broadband communications links. It closely regulated Korea Telecom in various respects.

The United States, by contrast, has fallen well behind these other countries. Indeed, today, the United States is not ranked among the top ten countries in the world in terms of broadband penetration. Moreover, our version of broadband is little, versus the Big Broadband that can be found in Korea and Japan and elsewhere in Asia, where speed can be ten to even 50 times faster.

If Big Broadband in America reached 100 percent of all households at affordable prices, we would see the growth of many new markets. Other countries show us that video games, for instance, produce new revenues for communications carriers. This may not be of much appeal to fumble-fingered formerly youthful people like me, but it's a new market that creates new jobs and new revenue. And it isn't growing in this country as fast as in other countries because our infrastructure is not as well-developed. Moreover, in other countries, where the speed of access tends to be higher, video can be more readily sent over the Internet. Not just entertainment, but education and health care are best delivered in part through video. These social services can be supplied effectively by broadband. We have every reason to worry about burgeoning costs of health care and our shortfall in providing education: broadband is an essential part of obtaining the productivity gains in both health care and education that will help up address our concerns.

However, the good news is that the United States has an opportunity to regain worldwide leadership in telecommunications by taking advantage of a new technology that is on the verge of deployment. Wireless broadband has the potential to energize our broadband services segment.

When Congress in the early 1990s authorized the FCC to auction radio spectrum, it gave technologists and entrepreneurs the tools needed to use not just Bell, but also Marconi to build an information economy. In the decade since, wireless has emerged as the most important means of voice communications and the Internet has emerged as the most important new medium of pictures and text.

We are now entering the decade of wireless broadband, the era in which airwaves can be used to carry Internet transmissions much more cheaply, with easier access, than mere fixed wire networks can do.

One species of wireless broadband is called Wi-Fi. Many people are familiar with a radio technology called Wi-Fi. If you have a laptop that is Wi-Fi enabled, you

know that it connects over the air to a router, which in turn connects to a cable modem or a DSL box. You can walk around the house with the laptop and stay always on the Internet.

Wi-Fi can be found not only in homes but in airports, coffee shops and many other places. These hot spots are places where you can use the laptop today to log on to the Internet using Wi-Fi. Just as the Internet has gone in about a decade from 6 million to about 600 million users globally, in the next 10 years hotspots will proliferate from about 7 million to about 700 million locations. The reach of such hot spots is about 300–1000 feet from an existing wire line Internet connection.

However, in order to do without DSL or cable connections, many cities are contracting with service integrators to deploy antennas that create a mesh of Wi-Fi connectivity over very large radii. These mesh networks are based on principles similar to those on which the Internet is based. Any laptop or other device with Wi-Fi capability can connect to the network of antennas and stay connected even while the owner carries the laptop from place to place. The networks consist of routers with antennas on street lamp poles and telephone poles. Cities with such networks today include HalfMoon Bay, San Mateo and Cerritos in California, Baton Rouge and Lafayette in Louisiana, and North Miami Beach, Florida. These are representative illustrations. A large scale example is a recent request for proposals issued by the City of New York. See *http://www.nyc.gov/html/miscs/rfp__mobile__wireless__download.shtml*.

Another technology on the near-term horizon is called Wi-Max. It also uses open standards negotiated by engineers and private sector firms in the well-recognized IEEE process. Wi-Max also promises to bring inexpensive, high-speed Internet connections to the American home and workplace. Wi-Max is a label used to describe the following: a communications chip in a laptop (or really any other appliance) that sends a signal to an antenna at least several miles away.

Wi-Fi is a synonym for a suite of "802.11" protocols developed by the IEEE for use in unlicensed bands worldwide. Wi-Fi radio technologies are in use today on unlicensed spectrum in the 2.4 GHz and 5.7 GHz bands. Wi-Max is a wireless broadband radio technology specified by the IEEE in its 802.16a protocol. As of now, it also uses unlicensed frequencies fairly high in the spectrum chart. Both are open technology standards that can be used by any wireless broadband provider. Both have been endorsed by a wide variety of companies. Most interestingly, both these, and other related technologies, can be designed for use on various frequencies, including the far more desirable lower frequencies where radio waves are much longer and more useful for communications.

In addition there are still other flavors of wireless broadband that use related technologies and alternative standards. In general, the technology world assures us that wireless broadband can provide a data rate that will over a short period of time run up to the range of Big Broadband (10 Mbps or higher), and provide a cost-effective alternative to fixed line broadband such as DSL or cable modem, if the government takes the right steps to welcome wireless broadband into the competitive arena. Indeed, the cost for the wireless mesh network might be as low as one tenth—or even lower-than the cost of building new fiber to people's houses. With lower cost, we will at last have an effective efficient way to bring broadband to rural America.

Wireless broadband can also help keep the United States at the forefront of the technology revolution, creating new jobs and giving a much-needed stimulus to our economy.

To be clear, what I'm talking about is not the so-called third generation of cellular, also known as 3G. That term describes advances in cellular phones to carry data along with voice calls. The acronyms for 3G are: EVDO, UMTS, WCDMA, and EDGE. These technologies enable handheld devices to send and receive data to mobile users in amounts ranging up to several hundreds of kbps. This service is sufficient for applications such as short rnp3 downloads, limited Internet browsing, ring tones, e-mail, low-resolution pictures, and video clips.

These 3G technologies are the evolution path for the technologies used today by the mobile carriers and can be installed as an add-on to their network infrastructure. They are important and are being deployed now in the United States and worldwide.

But for higher speed, affordable broadband-and certainly Big Broadband at a rate of 10 megabits or more per second—a user must look to a wire-based connection or the new wireless broadband technologies.

Wireless broadband is not a new technology, by any means. The industry has been around for 15 years. Indeed, the Nation's leading experts on high speed wireless have been working on wireless broadband, learning lessons from years of trials, and their relentless efforts are now corning to fruition with the deployment of techniques

such as Orthogonal Frequency Division Modulation, beam forming for antenna reception, and, of course, IP as the way to deliver the bits. What is now possible is ubiquitous, metropolitan area wireless broadband coverage.

Wireless broadband can eliminate the need for per node wiring. The technology enables a self-organizing system, just like today's Internet, allowing nodes to be added or subtracted as needed, a feature that remedies defaults in wireline backhaul that may arise or interference that may be encountered. Advances in software claim to provide the reliability, security, and redundancy/diversity that are the foundation of public safety and other government communications systems, which are even more critical in this era of heightened national and local security.

Implementing this technology does not require digging up the streets. It does not require installing a vast infrastructure. There are no zoning ordinance encroachments. It requires no new towers. The entire infrastructure does not have to be completed before it can commence. Significantly, it can be modified to meet changes in requirements very cheaply.

But there are potential barriers that could delay or frustrate the entry of wireless broadband providers. One potential barrier is spectrum access. Wireless broadband today uses "unlicensed" spectrum. As the name suggests, unlicensed spectrum users do not need a license from the FCC to transmit over the airwaves. This is in contrast to licensed users of the spectrum like Verizon Wireless, Cingular; or T-Mobile; these companies hold FCC licenses that give them the exclusive right to use a particular set of electromagnetic frequencies in a particular geographic area. Unlicensed operators, on the other hand, do not have exclusive use of the spectrum they use. They must also use equipment that complies with various technical requirements that minimize the amount of signal interference they cause to other spectrum users.

The FCC has set aside some spectrum for unlicensed devices. These devices include cordless telephones, garage door openers, and wireless broadband. But there two problems with relegating wireless broadband to the unlicensed spectrum at and above 2 GGHz.

First, many of the current unlicensed spectrum bands are already too congested with other devices-there are a lot of cordless telephones and garage door openers out there.

Second, the current unlicensed spectrum allocations are at regrettably high frequencies. Waves at lower frequencies are longer in length. Longer length waves hold their energy over longer distances and also bounce around physical objects such as buildings. As a result, longer wave lengths are ideal for broadcast television—they can travel miles from a tower and find their way inside living rooms. These are the ideal wave lengths for wireless broadband, just as they were ideal 60 years ago for the original allocation to broadcast television. Another similarity is that broadcast television waves carry tremendous amounts of information (for example, digital TV waves will carry up 20 megabits per second.) Correspondingly, wireless broadband can deliver very high bit rates at lower cost and greater equality if it also uses the lower frequencies of broadcast television.

Of course, it is possible to relegate wireless broadband to higher frequencies. Those frequencies are useful for garage door openers—after all we do not want garage door opener to send signals over long distances, since the user wants to be opening his or her own garage and not the neighbor's. But to treat wireless broadband the same way as garage door openers would be to lower the value and raise the cost of this new technology.

Of course any frequency can be used for any kind of wireless business, if you ignore the cost. For example, the shortcoming of higher frequencies for PCS has led cellular firms to build more base stations to retransmit signals. But that has cost more money, hurt industry return on capital, and embedded additional costs for consumers for decades.

Engineers today for the most part agree that the cost of wireless broadband Internet access in the 700 MHz or 800 MHz bands is likely to be about 50 percent lower than if the technology is consigned to the unlicensed spectrum bands at or above around 2 GHz. See chart on page 24. The consequence of higher costs is higher prices for the consumer. If we want truly high speed Big Broadband Internet access for all Americans we need to help lower costs for the technologies being invented. This is a particularly important goal for rural America, where costs are inevitably going to be higher due to reduced density of customers, and for emerging markets, where higher costs take the prices of service beyond the reach of populations with much lower national incomes per capita than in the developed world.

Quite literally, the lower the frequencies assigned for wireless broadband, the more millions of people in rural America will be able to afford Big Broadband Inter-

net access, the more hundreds of millions of people in the world will be able to afford joining the Internet community.

Fortunately, in the United States new spectrum will become available in the 700 MHz band. This is ideal spectrum for wireless broadband. It has excellent propagation characteristics that will allow the build out of an inexpensive and ubiquitous wireless broadband network.

This spectrum is currently being used by TV stations operating on UHF Channels. The broadcast industry is converting from analog technology to digital technology, and during this conversion process every TV station in the country has been given two TV channels-one analog and one digital.

However, under the law, these stations must tum in their analog channel. This will clear UHF TV Channels 52–69 for other uses, including wireless telecommunications services. That spectrum covers from 698 to 806 MHz in the spectrum band, a total of 108 MHz. That spectrum should be the fit and proper home of wireless broadband.

So once again the tough job for Congress and the FCC is to push the recalcitrant and incentivize the willing participants in the private sector to promote innovation, productivity gains, and new job creation. The current chapter in this ongoing story of facilitating the creative innovation of capitalism will be written if Congress and the FCC can find ways to let businesses use the best spectrum physics can find for us not for analog UHF TV but rather for wireless broadband. This transformation of the use of that spectrum means for the economy literally hundreds of billions of dollars of extra growth and hundreds of thousands, if not ultimately millions, of new jobs-provided it were done quickly.

The first step I suggest is for Congress to urge the FCC to read correctly the meaning of legislation passed by Congress in 1997. That legislation requires broadcasters to tum in their analog channels at the end of2006, or when 85 percent of the TV audience is capable of receiving a digital television signal-whichever occurs later. As mentioned recently by the FCC staff, all households that get their TV through cable or satellite services should be counted in order to determine whether we have reached 85 percent penetration of digital television.

This certainly makes sense: anyone with cable or satellite is obviously no longer dependent on over the air broadcast for the television consumption, and so those are the households that should be counted to determine whether we have crossed the 85 percent threshold for the relinquishment of the UHF analog spectrum. Moreover, cable and satellite can either deliver a HDTV broadcast signal to a digital TV set in the consumer's home, or permit the consumer to convert such a signal through a set top box into an analog TV set. By simply telling the FCC to count wisely the 85 percent, Congress can make available the spectrum most useful for wireless broadband.

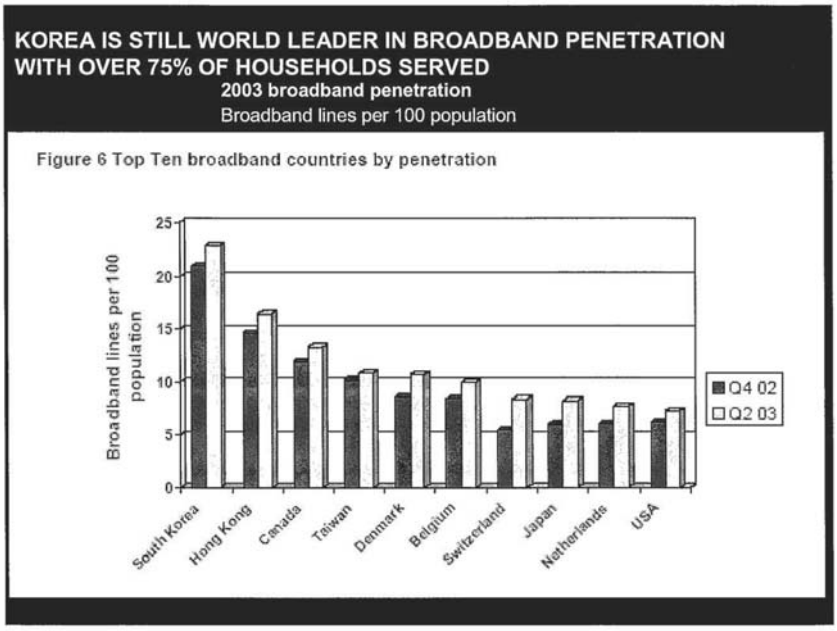
Next, Congress should take steps to allocate part of the 700 MHz spectrum for unlicensed use by broadband wireless services. In 1997, Congress directed the FCC to allocate 24 MHz of the 700 MHz band for public safety communications, and to allocate 36 MHz of the band for commercial use to be assigned through spectrum auctions. In order to facilitate wireless broadband in this spectrum, Congress could amend this 1997 law to allocate 30 MHz of this commercial spectrum for unlicensed services that would not be subject to an auction. In this way, Congress would have provided for wireless broadband public safety, licensed spectrum for wireless broadband, and unlicensed spectrum for wireless broadband: this perfectly wise trio of actions can produce millions of new jobs and billions of dollars of economic growth.

Congress should also instruct the FCC to resolve quickly a notice of inquiry it opened in December 2003. In that NOI the FCC asked about the feasibility of allowing unlicensed devices to operate in the TV broadcast spectrum at locations and at times when this spectrum is not being used. The FCC should quickly adopt a rule embodying that proposal. Then wireless broadband services could use UHF TV spectrum provided they do not cause interference to full-service television stations. This would be especially important in rural areas where there tend to be far fewer television stations, and thus vacant UHF TV spectrum. Furthermore the wireless broadband technologies that are deployed in rural America will prove to be ideal in developing markets where there also are relatively few broadcast television stations and much unused spectrum in the 700 MHz range.

The Congress should ask the FCC to take still other steps to facilitate the growth of wireless broadband. Wireless broadband requires the deployment of antennas in small boxes, small enough that they can be attached to a streetlamp pole or a utility pole. Due to the fundamental physical characteristics of wireless signal propagation, delivering the higher speeds enabled by wireless broadband requires a higher density of smaller cells as compared with traditional cellular networks. Therefore, wire-

less broadband needs access to these platforms so that its service is available ubiquitously. The FCC can and should ensure that no one exercise control over these platforms so as to prevent the deployment of wireless broadband services.

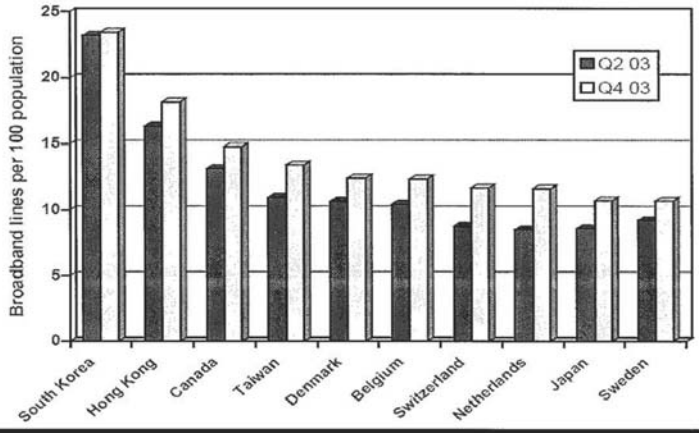
We are on the verge of being able to unleash a revolutionary broadband technology. This Congress and the FCC have a chance to take certain steps that will deliver tremendous cost savings to the emerging wireless broadband technology firms. We can save billions of dollars in cost, and thereby make wireless broadband available more efficiently to millions more people, without a significant expenditure of public funds on a subsidy program. We need only to allocate the optimal spectrum to the future of communication instead of to its past, and to remove other impediments to the rolling out over the airwaves of this new way to connect everyone to each other and to all the knowledge in the world.



WHILE THE U.S. IS NO LONGER IN THE TOP TEN

2003 broadband penetration
Broadband lines per 100 population

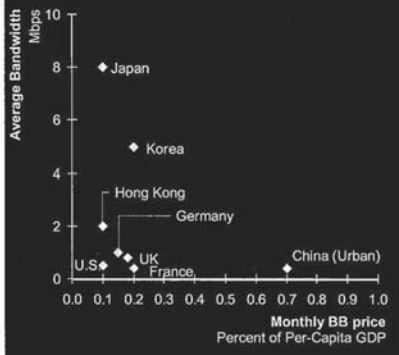
Figure 6 'Top ten' broadband countries by penetration



ASIAN SUBSCRIBERS GET MORE BANG FOR THE BUCK

2003 *PRELIMINARY*

Value for customers in ADSL service



Penetration by connection type
Percent of all households

	U.S.*1	Sweden*2	Japan*3	Korea*4
Narrowband (dial-up)	34	52	40	4
Middleband (up to 2Mbps)	24	9	5	65
Broadband (More than 2Mbps)	<1	6	19	8

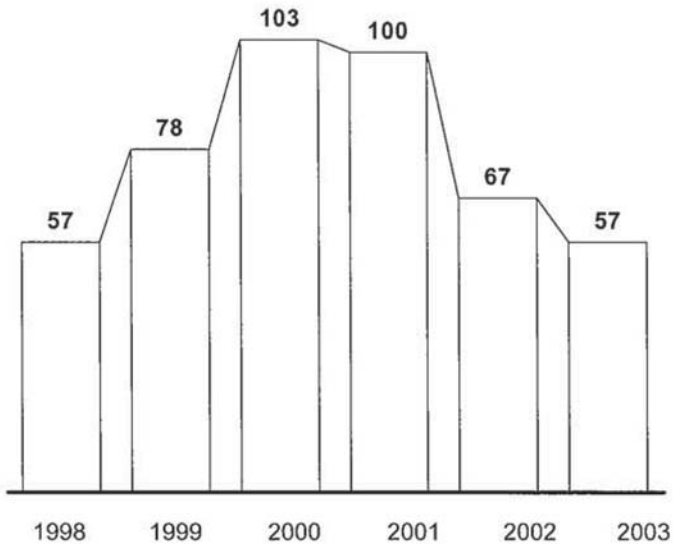
Official "broadband" penetration figures can be misleading

*1 Estimate from the number of overall DSL subscribers and speed/price offerings
*2 Broadband users are comprised of only B2's 10Mbps service subscribers
*3 Based on the Internet user survey by NTT-X, Broadband penetration is high in Japan owing to negligible price difference between middleband and broadband services
*4 Broadband users are comprised of only those of KT and Hanaro Telecom. More than 25% price premium exists for broadband service

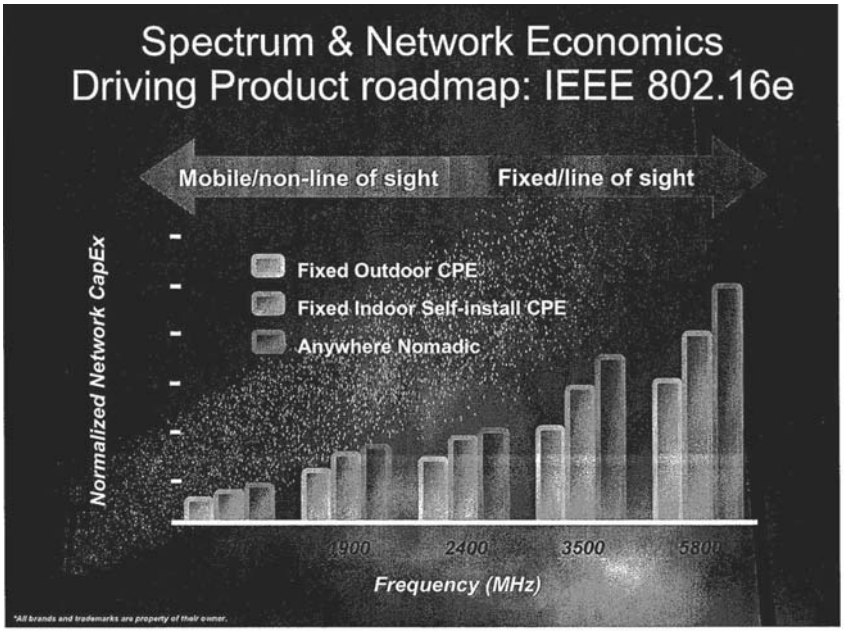
Source: Pyramid Research; Forrester; NTT-X; MIC; KT; Hanaro Telecom; Broadband Dashboard, 2003 Texas Instruments report; KT, Acca Networks; NTT

CAPEX HAS FALLEN BACK TO HISTORIC LEVELS

$ Billions



Source: Goldman Sachs, JP Morgan, Company reports



RESUMÉ OF REED E. HUNDT

Reed E. Hundt is a senior advisor on information industries to McKinsey & Company, a worldwide management consulting firm. His work with McKinsey has focused on helping senior management and boards address a wide range of strategic and other leadership challenges.

Mr. Hundt serves on the board of directors of Intel, Pronto Networks, Tropos Networks, Polyserve, Megisto, and Entrisphere. He is a special advisor to Blackstone Group, a New York-based private equity firm. He serves as a member of the advisory committee at the Yale School of Management.

Mr. Hundt served four years as Chairman of the Federal Communications Commission (FCC), from 1993 to 1997.

Mr. Hundt is the author of, "You Say You Want A Revolution: A Story of Information Age Politics." (Yale University Press, 2000). He is Co-Chairman of The Forum on Communications and Society at The Aspen Institute.

Mr. Hundt is a *magna cum laude* graduate of Yale College, earning a Bachelor of Arts with Exceptional Distinction in History (1969). He is also a graduate of Yale Law School (1974) where he was a member of the executive board of the Yale Law Journal. He clerked for the late Chief Judge Harrison L. Winter of the U.S. Court of Appeals for the Fourth Circuit, and is a member of the District of Columbia, Maryland, and California bars. Prior to his position as Chairman of the FCC, Mr. Hundt was a partner in the Washington, DC office of Latham & Watkins, a national and international law firm.

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The CHAIRMAN. Well, thank you very much, Mr. Hundt.
Mr. Gifford, welcome.

STATEMENT OF RAYMOND L. GIFFORD, PRESIDENT, THE PROGRESS & FREEDOM FOUNDATION

Mr. GIFFORD. Thank you, Mr. Chairman. I find myself in the unanticipated position of having George Gilder call for the elimination of my former job and agreeing completely with Reed Hundt's comments. Thank you for the opportunity to speak with you——

The CHAIRMAN. In America, anything is possible.

Mr. GIFFORD. It's a new broadband world, Mr. Chairman. My name is Ray Gifford. I'm President of the Progress & Freedom Foundation, a think tank that explores the legal and policy issues of the digital age. Also relevant to my testimony here today, from 1999 to 2003, I served as Chairman of the Colorado Public Utilities Commission, which means I had to try and implement what Congress thought it meant and what the FCC told me Congress meant in the Telecommunications Act of 1996.

To think about a new communications act, we first need to think about the current Act and what we have learned. The Telecommunications Act of 1996 should be judged a qualified failure. It may have been a failure of concept or of implementation, but it certainly did not live up to the hopes of its framers. The current Act is a failure because it does not provide a framework that anticipates the broadband, packetized Internet age. It is a failure because it presumes that two mutually incompatible goals, market competition and universal service, can be seamlessly reconciled. It is a failure because it added a pervasive layer of wholesale regulation to an already encompassing retail regulatory layer. It is a failure because of statutory ambiguity and self-contradiction. Finally, it is a failure because the competitive successes of the past 8 years happened despite the Telecommunications Act of 1996, not because of it.

That failure is qualified, however, because the sectors the Act left relatively unregulated, wireless and cable, provide a road map of how to allow markets to emerge, regulation to receive, and consumers to benefit.

I have two points of counsel for the next Telecommunications Act. First, law and regulation should not, and indeed cannot, contain the dynamic, multi-platform competition of the broadband Internet age. This promise counsels a recognition that regulatory burdens need to be minimized, and more importantly, that the incentives for special interests to manipulate regulation to preordain a given market outcome need to be written out of the next Act.

My second point is that the institutions charged with implementing the legislative vision you enact are in need of fundamental reform and redesign. These progressive era institutions, the FCC and state commissions, which served us well, must have a different charge in the age of spectra and photons. Communications is no longer local or confined to a single platform. It is no longer just voice, but undifferentiated packets of voice and data that know no geographic bounds. The traditional jurisdictional distinctions cannot hold.

Next, the self-contained regulatory world and the legal distinctions that sustained it no longer signify. Legal definitions of information service and telecommunications service have no relation to today's underlying technological reality. Thus, while legal fights remain, to quote my colleague, Randy May, mired in metaphysics, the underlying technological reality remains that a bit is a bit is a bit, and should therefore be regulated as such in the next Act.

The regulatory regime needs to adapt to the architecture of today's networks. Thus, the physical layer should be regulated the same across all platforms, and the remaining logical applications and content layers may or may not be integrated depending on the preferences of producers and consumers. That said, a premature common carriage requirement on all physical layer connections could destroy integration that serves consumers best, and there is reason to believe that an unregulated market will drive to the optimal result.

This equally regulated, multi-platform world means regulators must loosen their control over pricing decisions. The old regulatory system allowed rates to be set to effectuate a vast cross-subsidy mechanism. In the new world, technologies like VoIP will evade regulators' attempts at special regulatory treatment.

Related to this, the intercarrier compensation system must be radically reformed so that access arrangements between carriers are rationally related to cost or better yet, left to the market, as is done currently in the Internet backbone market.

And last but not least, the flourishing of networks means universal service policy needs to be rethought and refocused. What is universal service for? Well, it subsidized basic local voice line or a broadband connection. If you're going to subsidize connections, who is eligible to receive compensation and how much?

Rural American need not be left behind, but recognize that the traditional means of service values, rate averaging and cross subsidies are not sustainable. Rural America then needs a universal service policy that encourages innovation, scale, and competition. Subsidy mechanisms that spur competitive innovation rather than protect legacy industry structure need to be encouraged.

The Committee also needs to think about what sort of institutions need to implement the next Communications Act. The current FCC is slow, technology is fast. The current FCC is riven by muddied political compromises and legal uncertainty, capital markets that will finance the next generation of networks need certainty and legal clarity. Administrative regulation such as currently practiced by the FCC and state commissions is Mother-may-I regulation. Mother-may-I regulation relies on advanced permission for engaging in this practice or that. Thus, companies have to get permission from the regulator to do business, get permission from the regulator to define the terms of a contract, and get permission from a regulator to charge a given price for a given set of services. This regulation was devised for an era of regulated monopoly and can no longer be sustained.

By contrast, "wait until your father gets home" regulation occurs after the fact. This for the most part is what we empower agencies like the Federal Trade Commission and the Antitrust Division with doing. In this sort of world, the market and market players are free

to do what they want and use what technologies they want, subject only to "after the fact" antitrust and consumer fraud supervision.

This, I submit, is the sort of regulatory model that is suited for the next Communications Act. It is law applying rather than law making. It minimizes regulatory errors. State regulation, meanwhile, in its traditional role of regulating prices and terms and conditions, has no place in the next Communications Act. State agencies have proven politically attentive and possess skills and resources to regulate franchise monopolies, but they are ill-suited to make competition policy. This is not to say that all state regulation need be wholly tossed aside. States, for instance, have adjudicative capabilities that the FCC does not.

Finally, I urge you to reconsider the size and structure of the FCC. I think it's not beyond the pale to consider things like a single administrator agency such as Britain's OFTEL and also making the FCC part of the administration so there's accountability for the decisions it makes.

In conclusion, the next Communications Act is of enormous import. Congress cannot write a statute that means all things to all people. It will have to make choices about what sort of laws it wants to govern for the broadband Internet age. Those choices will dictate the nature and speed of the current and next generation broadband networks. Thus, this is not merely a matter of which company wins with this provision or that provision of the next Act. It is a matter of international competitiveness and America's role as the preeminent digital age economy.

On Monday, President Bush noted that clearing out the underbrush of regulation will get the spread of broadband technology and America will be better for it. President Clinton's Administration championed the unregulation of the Internet. Unregulation and clearing out the underbrush should be the charge that you accept.

Thank you for your time.

[The prepared statement of Mr. Gifford follows:]

PREPARED STATEMENT OF RAYMOND L. GIFFORD, PRESIDENT, THE PROGRESS & FREEDOM FOUNDATION (FORMER CHAIRMAN OF THE COLORADO PUBLIC UTILITIES COMMISSION)

Mr. Chairman, members of the Committee, thank you for the opportunity to speak with you this morning. My name is Ray Gifford. I am President of The Progress & Freedom Foundation, a think tank that explores legal and policy issues of the digital age. Also relevant to my testimony here today, from 1999–2003, I served as Chairman of the Colorado Public Utilities Commission, which means I had to try and implement what Congress thought the 1996 Telecommunications Act meant, and what the FCC told me Congress meant in the Act.

The topic here today is what a reworked Communications Act should look like. I have some thoughts about that. First, however, before thinking about a new Communications Act, we need to think about the current Act and what we have learned.

I believe that the Telecommunications Act of 1996 should be judged a qualified failure. It may have been a failure of concept or of implementation, but it certainly did not live up to the hope of its framers. The current Act is a failure because it does not provide a framework that anticipates the packetized, broadband Internet age; it is a failure because it presumes that two mutually incompatible goals—market competition and universal service—can be seamlessly reconciled; it is a failure because it added a pervasive layer of wholesale regulation to an already encompassing retail regulatory layer; it is a failure because of statutory ambiguity and self-contradiction. Finally, it is a failure because the competitive successes of the past eight years—in wireless, in broadband and now-emerging Voice over Internet Protocol (VoIP) services—happened despite the Telecommunications Act of 1996, not

because of it. That failure is qualified, though, because the sectors the Act left relatively unregulated, wireless and cable, provide a roadmap of how to allow markets to emerge, regulation to recede and consumers to benefit.

I understand that you are always supposed to have three overarching points to make, but I'll consider my testimony a success if I convince you of two. My first point is that law and regulation should not—indeed, cannot—contain the dynamic, multi-platform competition of the broadband Internet Age. This premise counsels a recognition that regulatory burdens need to be minimized, and, more importantly, that the incentives for special interests to manipulate regulation to preordain a given market outcome need to be written out of the next Act.

My second point is that the institutions charged with implementing the legislative vision you enact are in need of fundamental reform and redesign. These progressive-era institutions—the FCC and state commissions, which have in many ways served us reasonably well in the age of the circuit switched, copper network—must have a different charge in the age of spectrum and the photons.

The System Is No Longer Closed

The Communications Act of 1934 was written when the country had a unified, closed platform, the twisted-copper-pair-based Public Switched Telephone Network (PSTN). Every consumer needed access to that platform. People who wanted to communicate were locked-in to that platform. Because it was distance-sensitive, the regulatory apparatus could encompass the entire communications universe. There was a single product. It was voice communications. State commissions could set retail and intra-state rates; while the FCC could handle inter-state long distance. Rates could be manipulated to serve the social goals of keeping rural and residential rates low by making business and long distance rates high.

Of course, technology started to erode this hermetic world. First, competitive entry came in the long distance market, where artificially high long distance rates attracted entry. Next, gradually, competition came to the business market in the late 1980s and early 1990s, where artificially high business rates induced new competitors to enter under the incumbents' price umbrella. This world, interrupted only slightly by the Modification of Final Judgment (MFJ), led us to the Telecommunications Act of 1996, which aimed to bring competition into the local voice communications market.

That single-platform voice world had some defining characteristics that made it necessary and relatively easy to regulate. First, it was localized, meaning that it was divisible into distinct local and long distance parts, and the infrastructure on which the communications traveled followed a knowable geographic path. Second, it was self-contained, meaning that the regulator could accomplish social goals by manipulating rates to accomplish desired ends. Third, this world had a single product—voice—integrated onto a single platform, the PSTN, and therefore could be regulated distinctly as a "telecommunications service."[1] Finally, that world could be regulated according to the broadest of broad standards, the "public interest."

This age is at an end. Today multiple existing and emergent platforms compete for consumers' communications dollars. Along with traditional PSTN-based service, consumers can choose between wireless PCS, e-mail and instant messaging, circuit-switched cable telephony and emerging VoIP technologies. VoIP in particular promises to bring a torrent of choice and progress that will rush over, through and past the old legacy regulatory rules. Moreover, these emerging platforms will only thrive so long as they avoid the old legacy regulatory quagmires and classifications.

If we have moved from a closed to an open system of competing platforms, what does this mean for law and regulation?

As an initial matter, communications is no longer local, but instead national and even international in scope.[2] A packetized communication, be it voice or data, does not followed a prescribed geographic path. The traditional jurisdictional distinctions cannot hold.

Second, the self-contained regulatory world and the legal distinctions that sustained it no longer signify. Further, maintaining these distinctions into the future will do serious harm to consumers and producers. Legal definitions of "information service" and "telecommunications service"—such as are fought about endlessly in the Brand X Internet case, the FCC's VoIP proceedings, and the FCC's title I Broadband proceeding—have no relation to today's underlying technological reality. Thus, while the legal fights remain, to quote my colleague Randy May, mired in

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[1] See 47 U.S.C. § 153(46). The legal counterpart to a "telecommunications service" is an "information service," defined at 47 U.S.C. § 153(20).

[2] See Douglas C. Sicker, "Delocalization of Communications Networks," *Progress on Point* 11.2 (The Progress & Freedom Foundation, Jan. 2004).

"metaphysics," the underlying technological reality remains that a "bit is a bit is a bit," and should therefore be regulated as such in the next Act.

Third, it is no longer necessary for carriers to integrate facilities and services at the physical layer of the communications platform. The regulatory regime needs to adapt to the architecture of today's networks. Thus, the physical layer should be regulated the same across all platforms, and the remaining logical, applications and content layers may or may not be integrated depending on the preferences of consumers. The layered conception of regulation means voice is merely another application running over a physical network, and thus cannot be distinguished for special regulatory purposes.

Just because a layered conception of an Internet communications world is helpful, that does not mean it dictates given regulatory outcomes. We simply do not know the optimal degree of bundling and integration that will best serve consumers. In a competitive broadband, packetized world, there is reason to believe the market will drive to an optimal result of integration and bundling that is beneficial to consumers. A premature "common carriage" requirement on all physical layer connections could destroy the integration that serves consumers best, and there is reason to believe that an unregulated market will drive to this result.

Further, this equally-regulated, multi-platform world means that regulators loosen their control over pricing decisions. The old regulatory system allowed rates to be set to effectuate a vast cross-subsidy mechanism. In the new world, technologies like VoIP will evade the regulators' attempts at special regulatory treatment. In the end, just as now, the costs of networks must be borne by consumers. A freer, more explicit pricing system will serve them best. Related to this, the intercarrier compensation system must be radically reformed so that access arrangements between carriers are rationally related to cost, or better yet, left to the market, as is done currently with the Internet backbone market.

Last but not least, the flourishing of networks means that universal service policy needs to be rethought and refocused. What is universal service for? Will it subsidize a basic, local voice line or a broadband connection? If you are going to subsidize connections, who is eligible to receive compensation and at what rate?

Rural America need not be left behind, but recognize that the traditional means of universal service values—rate averaging, cross-subsidies—are not sustainable. Rural America then needs a universal service policy that encourages innovation, scale and competition. The viability of programs such as reverse auctions, which would create competition for universal service support and encourage low cost innovators, need to be studied. Likewise subsidy mechanisms that spur competitive innovation rather than protect legacy industry structure need to be encouraged.

The Institutions Must Reform

The Committee also needs to think about what sort of institutions need to implement the next Communications Act. The FCC is slow; technology is fast. The FCC is riven by muddled political compromises and legal uncertainty; capital markets that will finance the next generation networks need certainty and legal clarity. Because of its tendency toward political, as opposed to legal, determinations, the FCC has a dismal record in the courts on appeal.

Put broadly, there are two sorts of regulation—"mother may I" and "wait 'til your father gets home." Administrative regulation, such as is currently practiced by the FCC and state commissions, is "mother may I" regulation. "Mother may I" regulation relies on advance permission for engaging in this practice or that. Thus, companies have to get permission from the regulator to do business, get permission from the regulator to define the terms of a contract, and get permission from a regulator to charge a given price for a given set of services. This regulation was devised for an era of regulated monopoly, when there was a single provider and a limited set of services.

This regulation is prone to high error costs because it presumes to set rules in advance. By its nature, mother may I regulation assumes the regulator knows best. But if the regulator does not, or even makes an honest mistake, then the whole industry can suffer.[3]

By contrast, "wait 'til your father gets home" regulation occurs after the fact. This, for the most part, is what we empower agencies like the Federal Trade Commission

[3] A shining example of how the law of unintended consequences applied to the Telecommunications Act came with the reciprocal compensation debacle. There, the prospect of garnering huge windfalls from Internet-bound reciprocal compensation distorted innumerable telecommunications business plans, all to no competitive benefit.

and Antitrust Division with doing.[4] In this sort of world, the market and market players are free to do what they want, use what technologies they want, do business with whom they want and charge what they want, subject only to after the fact oversight for antitrust violations, consumer fraud or other breaches of legal or contractual obligations.

This, I submit, is the sort of regulatory model that is better suited for the next Communications Act. It is law-applying rather than law-making. It minimizes regulatory errors. "Wait till your father gets home" regulation has the added advantage of allowing technological ingenuity and entrepreneurial dynamism to take the market in places the regulators cannot have ever imagined.

State regulation, in its traditional role of regulating prices, dictating contractual terms and conditions, has no place in the next Communications Act. State agencies have proven politically attentive and possess skills and resources necessary to regulate franchised monopolies. But they are ill-suited to make competition policy. This is not to say that state regulation need by wholly tossed aside. States have adjudicative capabilities that the current FCC does not. So long as private carriers do not resort to private arbitration models for contracting and dispute resolution, there could be a state role here. Likewise, state regulators might be better prepared to assume a greater role in consumer protection.[5]

Finally, the size and structure of the FCC should be reconsidered. Congress needs to consider whether a single agency administrator, like Great Britain's communications regulator, would better serve the policymaking needs of the broadband Internet age. Congress should also consider making that administrator part of the executive branch, thus making communications policy—like antitrust policy—accountable to the President.

My experience with the FCC is of an agency of singularly dedicated and qualified individuals working tirelessly to follow the law and make sound policy. Yet, the FCC's record in the courts is dismal. The fluidity of the FCC's processes and the political nature of its compromises are designed for an agency charged with close-regulation. To become an agency geared toward implementing sound competition policy, the FCC must be reformed to speak more singularly, adjudicate disputes lawfully and regularly, and become less of a forum for lobbying campaigns, than one of neutral legal disputations.

Conclusion

The next Communications Act is of enormous import.

Congress cannot write a statute that means all things to all people. Congress will have to make unambiguous choices about what sort of laws it wants to govern the broadband Internet age. Those choices will dictate the nature and speed of the current and next-generation broadband networks. The choices will further determine the competitive station of the U.S. compared to the rest of the world. Thus, this is not merely a matter of which company "wins" with this provision or that provision of a rewritten Communications Act. It is a matter of international competitiveness and America's role as the preeminent digital age economy.

On Monday, President Bush noted that "clearing out the underbrush of regulation, . . . we'll get the spread of broadband technology, and America will be better for it." President Clinton's administration championed "the unregulation of the Internet."

Unregulation and clearing out the underbrush should be the charge you accept. I do not deny that in lawmaking there is an element of predictive judgment in my testimony today. With the proper regulatory conditions in place, new technologies will eclipse what remaining pockets of market imperfection persist in the communications space. But your choice is not between correcting market imperfections with perfect regulation. Your choice is between slightly immature, but largely self-correcting markets and demonstrably imperfect regulation, regulation that does not self-correct and, to the contrary, often impedes progress and economic growth.

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[4] This is not strictly true with functions such as merger reviews conducted by the Department of Justice or the Federal Trade Commission. The other salient difference between the FTC, DOJ and the FCC is that the former agencies are held accountable—by having to bring and prove their cases in court—to a rigorous standard of proof. By contrast, the FCC is subject only to after the fact review of their rulings under a deferential—but in recent years rarely met—administrative review standard.

[5] But, finally, states themselves need to think about their willingness to allow their state resources to be conscripted into a Federal statutory and regulatory scheme. The current clamor for more state involvement in Federal communications law decisions belies that this is a Federal mandate on the states, and an unfunded one at that.

As you sit down to fashion our next Communications Act, remember what we have learned since the '96 Act. Competition and innovations flourishes where regulation retreats. I urge you to bring that to the whole communications sector.

Thank you again for the opportunity to speak with you this morning.

The CHAIRMAN. Thank you very much. Just to have on the record, beginning with you, Mr. Thierer, do you all support the extension of the Internet tax moratorium?

Mr. THIERER. Yes, I think that's a very important proposal that's moving right now on the Senate floor.

The CHAIRMAN. Or not moving, depending on——

Mr. THIERER. Not moving, and I'm glad to see that you're attempting to broker a compromise on it.

The CHAIRMAN. It'll have ethanol and perhaps minimum wage to consider along with the Internet and others.

Mr. THIERER. This is quite a discouraging development to say the least, but I'm glad to see that you're trying to broker a compromise on this front. One hopes that we can get this finalized, because this is just the beginning of a potential flood of problems on the state and local front in terms of taxation, and VoIP is certainly the next target there, and then there's Wi-Fi.

The CHAIRMAN. Well, as you know, the opposition, and I'll go to Mr. Ferguson next, but the opposition, all they have to do is obfuscate and delay. You have enough ethanol amendments, you have enough minimum wage amendments, and then it dies and they succeed, so it's a situation where we have to act proactive rather than let existing law, which has already lapsed.

Mr. Ferguson?

Mr. FERGUSON. Senator McCain, I would support the extension of the Internet tax moratorium, but I would like to add and question everyone involved that taxes or the absence thereof with regard to these questions in this industry are extremely unimportant relative to accelerating the rate of technological change. If you get 50 percent per year improvement in price performance, in 5 years that will totally drown out even a very large tax.

The CHAIRMAN. Thank you. Mr. Gilder?

Mr. GILDER. I'm for the moratorium and on taxation of the Internet.

The CHAIRMAN. Mr. Hundt?

Mr. HUNDT. I have a more conditional view. I believe that e-commerce is so certain to be huge, it already is very large, it's so certain to be huge that sooner rather than later it's important to figure out the answer to the sales tax problem.

The CHAIRMAN. You know, I agree with you, Mr. Hundt, but I look at the spectacular failure of a simplified tax system with regard to catalog sales, and so to wait until it happens I think would be a long wait.

Mr. HUNDT. I have no disagreement with your observation, but this problem is growing by hundreds of percent per year. Point number two, local municipalities, as you well know, have one issue that I'm sympathetic with and I suspect everyone is sympathetic with. They are almost always constitutionally in their states obliged to have equal treatment across all the different communications media, and it's not clear to me that any of them know how to do that with the new paradigm of broadband access and conver-

gence and there's no need, I agree, there's no need to be approaching this brand new world of broadband with a sense of what taxes do we want to impose. But in terms of parity, I don't think there's guidance to be found for these municipalities in Federal law or in their own state law, and it's an unsolved problem.

Why does it matter? Because they do have to pay for swimming pools and public schools and libraries and local roads, and I'm sure the Committee knows, in the last 3 years of economic downturn and flatness, localities all across the country have lost somewhere between 10 and 40 percent of their revenue base.

The CHAIRMAN. In reality, that's not true. In the last couple of years, they've all had increases in state and local budgets. I'll be glad to provide you with that information we presented on the floor. They've experienced an economic recovery over the last couple of years and a significant increase in revenues, including my own state of Arizona. Spending has gone up faster than their revenue increase, but their revenue has increased. I'll be glad to provide you with that information, because this is the refrain we hear from the opponents of the extension on the moratorium.

Mr. HUNDT. I had 100 of them tell me this at a conference 3 days ago so I wish I had had your information.

The CHAIRMAN. Like to have been there and shown them their spending charts, yes. Drunken sailor, I believe, is the operative.

Mr. HUNDT. I wouldn't have said that to them.

The CHAIRMAN. Thank you, Mr. Hundt. Mr. Gifford? Because I have one more quick question, if you'd respond and pull the microphone please.

Mr. GIFFORD. I absolutely support extension of the Internet tax moratorium. I think it's crucial.

The CHAIRMAN. Thank you. Mr. Hundt, I want to get into this proposal of yours. As you know, Chairman Powell has made pretty much the same proposal. What's the hang up? Broadcasters obviously, and also, perhaps more important to me anyway, are, as you mentioned, a few hundred thousand people who are still dependent on over-the-air television broadcasting for their television viewing.

It seems to me, and I'm not trying to put words in your mouth, if we could experience the literally hundreds of billions of dollars of benefits from the use and auction and allocation of, as you mentioned, of analog spectrum given back, that we could easily afford to provide every one of those homes with a set top box or some other device. I'm not one who generally favors government giveaways, but when you look at the incredible benefit associated with the acquisition of that analog spectrum, that that would be at least some way of taking care of the ever-shrinking number of American households, and they are low-income households, so I am more and more inclined to taking some of those proceeds and providing those households with the ability to get their television viewing in return for this enormous benefit.

And that's my question to you, but also, how do we overcome the National Association of Broadcasters? They sat right here and guaranteed us that those analogs would be returned, and I said at the time, I said, it's not true, you're not telling us the truth. And they weren't.

Mr. HUNDT. By way of violent agreement, this Congress, and you were very much a part of this, Senator, after the 1996 Telecom Act, followed up with the Satellite Home Viewer Act a couple of years later, that was a tremendously wise statute because that produced a new capability for satellite to deliver digital video, and as everyone here from a rural state knows, it has completely transformed the viewing habits of Americans primarily outside metropolitan areas. When you take the cable penetration and add it to the satellite penetration that has been obtained, we are now pushing against 90 percent.

The problem that you and I, Senator, were on the same side of with respect to digital broadcasting 8 years ago, it was sublimely difficult then, it is ridiculously easy now, because we are down to such a tiny percentage of homes that depend on over the air for their TV. Yes, everybody would like to have it if it's free, everybody says I'd like to have it, but they don't depend on it. They have cable or they have satellite, we have roughly 90 percent that have reached that number.

If indeed it is absolutely necessary to buy a dish or a cable subscription for the remaining 5 or 6 percent or whatever number it is, first of all, I would find that passing strange, but if it were necessary, the cost that we would be talking about for doing that would be in the neighborhood of just a couple of percent of the economic benefits to be obtained, not just from auctioning the spectrum, but from opening all that spectrum up to wireless broadband so that we would actually have broadband be affordable for 95 percent of Americans.

So it's a question of whatever it takes, but right now all the FCC has to do is look at that 85 percent that I remember you were crucial in making sure wasn't 95 percent, look at that 85 percent and that number and count it right, and say when you add up everybody who has a cable subscription that gives you a digital feed, and when you add up everybody who has a satellite subscription that gives you a digital feed, and you realize that with a digital feed if it pleases you to buy a digital receiver you'll watch HDTV, if it pleases you to buy a box you can translate it to that. That's up to you. If you add them up right, you're going to be at 85 percent, the threshold will have been met.

The CHAIRMAN. Could I have brief comments since my time's expired, from the other panelists about this issue? Mr. Thierer?

Mr. THIERER. I find myself as well in violent agreement with this and I like the Reed Hundt plan. I haven't had a chance to say that much in the last 10 years, but I really like what Mr. Hundt outlined, and I love what you said, Mr. Chairman, I think it's the right path. We should probably consider a transitional subsidy mechanism, and I usually don't endorse that either, but here it makes sense to return the very valuable analog spectrum or whatever we can get back from the broadcasters. We need to structure that as a limited, means-tested targeted approach, but it's very much doable. There are boxes on the market today that can be utilized for this, that can be handed out for that purpose. I personally right now have three HDTVs in my house and three set top boxes that are about to be obsolete, but they'll still receive a digital signal. They could be handed out to a lot of other people for a very low

cost, and that could assist us in getting up to the threshold, whatever it is, 95 percent to have universal television service, and then we can get that analog spectrum back.

The CHAIRMAN. Mr. Ferguson?

Mr. FERGUSON. Senator McCain, I'm going to in some way repeat myself. I'm all in favor of spectrum reform, I'm all in favor liberating that spectrum from the National Association of Broadcasters, I feel your pain. But I once again must caution everyone concerned that this is not going to solve the broadband problem for extremely fundamental technological reasons. It has long been the case and continues to be the case that wireless technologies are behind wire line technologies by about two orders or magnitudes, well, two generations, one order of magnitude in their price performance characteristics, and all of the nations that are now well ahead of us in broadband deployment are using wire line deployment and they are doing so using competition in the wire line sector.

The CHAIRMAN. Mr. Ferguson, I don't disagree with anything you say, but I'm trying to free up the spectrum. I'm trying to free it up as quickly as possible, and if you've got a better way of doing that, I'd love to hear it.

Mr. FERGUSON. No, no, I don't mean to disagree with the proposition that it should be done. I'm sorry.

The CHAIRMAN. Thank you. Mr. Gilder?

Mr. GILDER. I agree with the proposition with no buts.

The CHAIRMAN. Mr. Gifford?

Mr. GIFFORD. Absolutely.

The CHAIRMAN. Thank you. Senator Dorgan.

STATEMENT OF HON. BYRON L. DORGAN,
U.S. SENATOR FROM NORTH DAKOTA

Senator DORGAN. Mr. Chairman, thank you. First of all, this is I think an interesting discussion and one that is really important and necessary. Let me ask a couple of questions about some of the testimony about the pace of broadband deployment in, for example, South Korea and Japan. Can one of you tell me what kind of involvement by government incentive or regulation or policy has resulted in that kind of development or build-out or is it just serendipitous that they decided somehow as a group of people living on this Earth we all want to create a new demand for broadband? Was there something that represented government policy that has resulted in this extraordinary rate of build-out? Mr. Ferguson?

Mr. FERGUSON. The answer is yes. There are common characteristics to most of the nations that are now well ahead of who are not, by the way, just the nations you mentioned, but they include Israel, they include Canada, they include France. The most dramatic are South Korea and Taiwan and Japan, but the others are important too.

And they all share one characteristic and most of them, not all share a second. The first that they all share is that there has been a strong government recognition that this technology is imperative for their societies and that they must overcome the opposition of their incumbents and create a truly competitive industry, and in fact, if you look at the Japanese market, it is fiercely competitive based up on resale at very low prices of loops to competitors.

Senator DORGAN. Is it a type of UNE–P process almost?

Mr. FERGUSON. Yes. The details are very different because these countries are different, their regulatory systems and industries are different, but in effect yes, it's the government saying you must sell to anybody at roughly this price and you have to let them into your central offices and you have to let them connect, and if you don't do it in a prompt and timely way, we are going to make damn sure that you do.

Senator DORGAN. And that has created robust wire line competition for broadband?

Mr. FERGUSON. Yes.

Senator DORGAN. Mr. Gilder, I only heard the last part of your testimony, I read it, and as Senator McCain indicated, it is interesting. If you had been advising the Japanese, would you have advised against what Mr. Ferguson just described they did?

Mr. GILDER. Yes, I would have advised against that, but the key thing about Japan is it's simple, there's one body that sets the rules and they observe the rules. It's not litigated through 50 states and the FTC and FCC, it's not this maze of rules and opportunities for litigation.

Senator DORGAN. Mr. Gilder, would you believe that we should continue some kind of universal service fund?

Mr. GILDER. No.

Senator DORGAN. Do you believe a universal service approach should be abandoned?

Mr. GILDER. I think so.

Senator DORGAN. And therefore price and open competition should determine what people pay for a service?

Mr. GILDER. Yes.

Senator DORGAN. Universality is not any longer a national goal or of national interest?

Mr. GILDER. Well, I think you can retain universal wire line phone service if it's a deep commitment. I think it will reduce the universality of a service, that a free market will deliver more telephony, more broadband, more services of all kinds than a regulated, universal regime.

Senator DORGAN. But if a free market would decide that the cost of a communications service is $180 in a small county in a rural part of North Dakota versus $22 in an urban county in New York, that's just the way it is and if the folks who can't afford it in that small rural county can't afford it, tough luck?

Mr. GILDER. I think it's regulation that's resulted in costs in the United States that far exceed the costs that are being delivered demonstrably in other countries at far lower prices, the services that are delivered at far lower prices.

Senator DORGAN. The reason I asked the question is I wanted to see how far this entertaining philosophy goes, and I obviously have some very significant disagreements with you about universal service. I think that in this area, whether they build out a broadband or a basic telecommunications service, I think the principle of universality has been a critically important principle, and we have by public policy driven that principle in a constructive way to benefit all citizens in this country.

So having said that, let me just also ask a question about something we have done. Senator Burns and I have authored legislation that is on the books that provides a substantial number of dollars in loan guarantees, well over $1 billion in loan guarantees at RUS for the build-out of broadband services. Both of us are a little chagrined that there has been very little happening with respect to that. I think in terms of public policy, I think our country ought to decide and describe a public policy that is aggressive, that uses the market system, but also uses the capability of effective regulatory judgments here and tries to accelerate the build-out of broadband.

Mr. Hundt, are you aware of the provision that is now law that has this money resting at RUS down at the Department of Agriculture, but effectively not being used in any significant way?

Mr. HUNDT. Yes, and by contrast, in Korea, the government spent about $1–1/2 billion on direct cash grants for network backbone build-out and also set aside more than $1 billion, I think it's roughly the same number, although it's a much, much smaller country, for low-interest loans to operators for actually building high-speed, physical mediums, typically fiber. That didn't pay for all of it, but it was a catalytic effect on the development.

Senator DORGAN. And that's what we have done here, and we've obviously talked to the Secretary of Agriculture and said, let's get moving here, the Congress has appropriated this money, it's available, and we want to accelerate the deployment.

But let me also make another point that I think is important. It relates a little bit to the universal service issue. I saw an ad a while back, I think it was about Blackberry, and most of you perhaps walk around with some form of electronic communication. Do some of you have a Blackberry? Yes. And so if you read an ad about it, it says covers 95 percent of the country. What they mean is population, because you get on an airplane here and fly to a substantial portion of America and deplane at an airplane someplace, your Blackberry's not going to work. But it's true that it covers 95 percent of the population centers, but go to North Dakota, for example, and try to pick up your signal, it doesn't exist.

My point is that the build-out of some of these services, as we talk about them in these hearings, we sort of describe them as, well, everybody has access to all of this right now. They don't. It is very uneven. Obviously the market system will move to those areas where the income stream most robustly provides support for the build-out immediately, and so you do have then digital divides in a number of areas, and it causes those of us from rural areas no amount of angst, as you might imagine.

And that's what I feel very strongly that our country ought to embark on a national policy of aggressive, robust build-out. I don't necessarily share a couple of the comments about regulation, quote, unquote. I think in some areas regulation has been wholly constructive and very important in the development of policies of how we move.

And if I might just make one comment, when AT&T was broken up and we developed by regulation in this country the opportunity for a very competitive long-distance service. It was so God-awful competitive that you couldn't eat meals without having your phone

ring having somebody ask you whether you wanted to change your long-distance service, and it drove down price dramatically. That was good competition, aggressive competition that benefited the consumer, but it only happened because of constructive government interference requiring AT&T to make their system available to others at wholesale price, because all these competitors didn't build facilities base competition models.

So as we proceed down this road, I think it's very important for us to understand we need thoughtful regulation, regulation that works, and then we need to use the market system, absolutely use the market system and all the juices that it contains to benefit consumers and help this build-out.

Your testimony, I've read all the five pieces of testimony, I think it is a really interesting contribution to what we face, because we have to think through about the 1996 Act what did we do, what has been the result of it, and there are some that want to go in immediately and just change it because they think it was just a complete failure. I don't believe that at all. I believe competition is coming slower in local exchanges than I would have liked, but I think that the basic philosophy behind this to try to create more competition in local exchanges to benefit the American consumer is basically still pretty good philosophy, and I hope that if there are changes to be considered here that they will be changes that will improve the Act, not represent a notion that the Act was somehow unworthy, because I don't share that vision.

I had some questions and I'm out of time. I'm sorry I didn't ask the questions, but I did want to say I think the statements that all of you have written are a really interesting contribution following on yesterday's hearing as we begin thinking through what we do now in the next 6 months or a year.

The one thing all of you have said, which is important for us, is our country needs a national policy with some urgency to catch up as it were, not necessarily to catch up in technology but to catch up in the will of our country to express itself with respect to an aggressive build-out of these new opportunities, because it will be job-creating and will produce greater productivity and economic growth in this country.

Mr. Chairman, thank you very much.

Senator BURNS. [presiding]. Thank you, Senator. Mr. McCain had to go to the floor and I've got a couple of questions and I think you've answered most of the questions just in your testimony. I can remember back in 1990, and Mr. Hundt, you were around about that time but you weren't chairman yet but you were going to rise to that position. I was sitting way down there where you had to have field glasses to see if I was there, brand new Senator, and the discussion on this Committee on that time was the re-regulation of the cable industry.

And I had it in my mind that rather than to re-regulate them, let's provide some competition, and I came up with a little idea called video dial tone. Remember that? You bet. And I offered my amendment, and the Chairman was Mr. Hollings, and he was caught off-guard. I remember Mr. Inouye, Wendell Ford, I mean, the whole gamut of the Commerce Committee, and all at once this idea that the competition into that where we had franchises at that

time and the state utility commissions were very much involved, Mr. Gifford.

And so I didn't know if I had enough votes to pass it and Mr. Hollings didn't know if he had enough votes to defeat it. When you get into a situation like that, you immediately adjourn the Committee and move to the back room and discuss things. And so we decided we'd have a hearing and we'd look at the law as it pertains to this and we would go on to another subject.

When I first came to the Senate, I was the only one in this town who did not think that spectrum was a national resource. I said it was a technology. The very reason for the FCC was to engineer it, and to make sure everybody who had some spectrum stay in their lane, just stay in their lane, and to use it any way that they so choose, and I still basically in my heart still believe that.

But I'm the only one that does. Maybe Mr. Gilder may agree with me on certain points. I know Mr. Ferguson would not. So we went into the auction idea. What happened? People come in and bought this spectrum and just spent money like you can't believe, especially in light of the 1996 Act. Now, there's a lot of you says it's been a failure, it hasn't worked, but up until the 1996 Act, this is the first time that this town acted since 1935, 1934.

We're dealing with technologies with a 1930s kind of tool. That wasn't going to work. And nobody had made a move to do anything. Whatever we did we had to get off a high center. So in that respect, I think the Act has contributed to a new dialogue and will probably lead to a new paradigm because there's no way we could have written that thing correctly. There is no way we could have done it.

So my question is, if spectrum is going to be treated as a national resource, let's approach the spectrum use and the fees as we do, like on any other piece of government ground, that we charge grazing fees, access fees, park fees. Let's go, we might sell it, but there's also going to be a little royalty paid every year and that you must put the spectrum into use, because we had a lot of spectators just bought spectrum out here and set it aside because it's going to be worth a lot more money later on and we don't have to do nothing, and that didn't work either.

So we've been looking at this spectrum policy a lot and we'll probably come up with one. We won't do it this year because we're going to talk about ethanol and minimum wage on an Internet tax bill, but next year I think you're going to see a lot of movement toward spectrum reform and new spectrum will be added and a new way of doing things, and I know several countries have looked at the royalty idea, and besides that, that brings more income to the Federal Government in perpetuity down the years than just one sale and then we spend the money, and the budgeteers always spend that money. I know they spent the same, out of the same pot for the last 5 years, and everybody spends out of it.

So I'm going to ask just a simple question. Since we got the dialogue started, since there wasn't anybody else around here that decided basically that little idea of video dial tone, led to a dialogue that finally got us to the 1996 Act, because that dialogue picked up and it just kept gaining, maybe we should look at this thing. Digital, everybody says the Internet was never mentioned, or emerging technologies. What in the world do you think ones and zeros; we

knew that everything was going to come down one pike and you weren't going to be able to identify a message as this is a radio band, this is a TV band. You're going to lose that identification because everything is going to be ones and zeros.

So it had to happen. We knew that then, and that's why we had several sections in there that applied to the build-out of broadband, and we knew that was coming, although there are a lot of people that overlooked those different sections.

What's the single greatest mistake that we made in the Act? The single greatest mistake when we passed the Act? And then I'm going to ask you, what is the single greatest mistake that the FCC made in applying the Act? Mr. Thierer?

Mr. THIERER. Well, thank you, Senator. Very simply stated, I think the biggest mistake was that the Congress delegated broad, ambiguous, vaguely worded authority to the FCC and trusted them to enforce something as complicated as the Telecom Act in a simple, efficient fashion, and that failed because the single biggest mistake the FCC made is it overzealously attempted to micromanage a lot of results into existence that might not have been tenable at the time, and we are now living with the repercussions of that. We have a much larger FCC that regulates now more than ever before and they're able to do that because the Telecom Act broadly delegated so much authority but didn't really have any way of reining them in, and there has been unfortunately, not enough done to pull back on some of those broadly worded authorities and powers.

Senator BURNS. Mr. Ferguson?

Mr. FERGUSON. Somewhat uncharacteristically, I will agree substantially though not completely with my colleague from Cato. I think that much of the law is correct and what has gone wrong is that the law has not been effectively enforced. I think that the FCC tried, but the combination of lobbying from the incumbents, the court system, arbitration, state jurisdictions, resistance from the incumbents which was not prosecuted effectively by the Department of Justice, even under the Clinton Administration, permitting the mergers, all those things subverted and eventually destroyed the intent, subverted the Act and eventually destroyed the ability of the FCC to do its job and of the law to be enforced.

Senator BURNS. Mr. Gilder, your writings and teachings are very refreshing. What do you think the biggest mistake that we made?

Mr. GILDER. I think you tried to privatize the risks and socialize the returns and prevented the emergence of a single industry by balkanizing it into scores of different categories.

Senator BURNS. Would you agree with the statement though, the initial step of this Act didn't benefit consumers?

Mr. GILDER. No.

Senator BURNS. Mr. Hundt?

Mr. HUNDT. Well, this is a bit of a when did you stop beating your wife question, Senator. I think it's important to recognize that we finally found an area of very radical disagreement even between Mr. Gilder and me. Benefit consumers, the prices for virtually every single communications service have dropped precipitously. The only exception is local telephone and that's gone up at approximately the same price as the correlation with the GDP growth, and

that's also because that's capped and set by the states, and that's a constitutional power that they have.

Now, overall the GDP in this sector is much, much higher, grew at more than double the GDP growth rate for the whole economy. Productivity gains are fantastic. Whenever Dr. Greenspan is up here telling you all about productivity gains and how that justifies super low interest rates, he's actually giving credit to the communications and computer sectors of this country, but not just the computer sector, because there were no productivity gains until the computer became a communications device.

Now, if you wish, my colleagues here all could say that happened in spite of the law, but I would like to say that it certainly wasn't stopped by the law, and as you said, it was stopped by the 1934 Act. It was important to kick that thing out and bring in something else, and I think you should feel very, very good about the changes.

Is there anything that was imperfect? There's one single thing. Whether you like the regulations or don't like the regulations, whether you think that the courts got it right and the courts got it wrong, everyone in the world ought to agree that there's no possible excuse for a judicial review process that 8 years after this law was signed is not even close to being finished. That is not a function of the FCC. That is a function of the absolutely intolerable inattention by the judiciary to the importance that they do their job crisply, clearly, and promptly.

We have had so much litigation that has lasted so long, and even now the FCC is in the middle of some kind of public opinion poll about whether to take the most important case back to the Supreme Court for what in effect is the fourth round on the same set of issues.

How can that be fixed in other statutes and other areas? Congress picks special courts and they expedite the judicial review process. If we had known in 1995 and 1996, how unbelievably protracted would be the judicial review process, I'm sure that all of us involved in that statute would have said we'll think of an expedited way to handle that. Even if you didn't like the court results, if I didn't like them, Adam liked them or vice versa, we all wished that they had actually happened instead of going on ad infinitum.

But I just want to say one thing. The four things I've asked you all to do here today, Senator, they are all within the ambit of the law. They do not require that you rewrite the law or that you have spectrum reform or philosophical changes of mind. They can all happen right away, and if they don't happen now, you will be saying to the entire world of engineers, don't design the cheapest wireless broadband, put all your R&D in designing much more expensive broadband will be slowing radically the whole development of wireless broadband. There's no reason for it.

We just need to nudge right over our friends at the FCC and say to them, this is important to the American people for competitiveness, for the social reasons Senator Dorgan talked about, for a standard of living going up, and the things I've suggested don't undercut the broadcasting medium. They're absolutely on the margin. I haven't said anything that should bother any broadcasting network governing 85 percent of the people.

And you know in your state, if you took that measuring stick, although people still happily hear your voice wafting in their memory over the radio waves, most of the spectrum isn't used. You know that.

Senator BURNS. Mr. Gifford?

Mr. GIFFORD. I think the Act did do some good things, Senator, but it was both too broad, as Adam said, in that it gave a very vast grant of amorphous power to the FCC to define what in a regular market we would call contract and property rights that various carriers have with one another. But it was also too narrow in certain circumstances if you take for example the reciprocal compensation piece of the Act, which was a very benign part, it appeared to be a very benign part of the Act. It turned out to be a multi-billion dollar arbitrage opportunity that distorted many companies' business plans——

Senator BURNS. That is true.

Mr. GIFFORD.—and led to no wealth creation or competition. And I think the second thing that the Act didn't anticipate, and in some ways it couldn't have, which is why we need to go through another iterative process to decide what the next Act should look like, is it was aimed at bringing competition to the voice market, and the voice market is not really what we should be focused and fixated on. As George Gilder said, it maintained the old distinctions between cable and wireless and common carriage and it prevented them from becoming one big, undifferentiated broadband market.

And where you look where we've had successes since the 1996 Act, it's those areas where there hasn't been as much regulation, which is the wireless sector and the cable sector.

Senator BURNS. But we knew those signals were going to merge, just like I said a while ago. We're not going to be able to tell if we intercepted any communication, whether it's coming from a television station, AM, FM radio, there was always differences, everything that we did. There was high band, low band, all these things were different.

But when that digital technology come in, it's just ones and zeros and it can travel high band, low band, whatever band.

Mr. GILDER. However, it travels better and farther in rural areas in low band, and that's why Reed's proposal is so important for those rural concerns which Senator Dorgan was raising.

Senator BURNS. I think you're exactly right. I appreciate your opinion on that, because we get hung up on little things.

Mr. Nelson, it's up to you.

Senator NELSON. Thank you, Mr. Chairman. I just want to ask Mr. Hundt, the goal that you've laid out I think is an important goal, that what's in the interest of the consumer is to deliver this product at the most efficient way, the cheapest price without interruption.

Now, what you have laid out you said we could do overnight by coming out with legislation in this Committee. As a practical matter, when you're talking about only 10 percent of the consuming public would have to be dealt with as you were talking, is it at the moment, since there's the resistance to go from analog to digital and therefore people haven't bought digital TV sets, isn't that resistance going to be a lot greater?

So would you walk me through that, the fact that the American consuming public aren't on digital TV sets now except that 10 percent. So walk through the practicalities of that.

Mr. HUNDT. Yes, sir. That's a very good question. This Committee, I think, for many, many years and virtually unanimously has felt that one of the things that ought to be universal is the receipt by everybody in the home of a television medium with lots of different channels so that you can choose your different entertainment and news and different points of view and so forth and so on.

But what has happened is that Americans have not wanted to settle for just the on average two or three channels that come out of metro markets in many of the states represented by the Members of this Committee for two reasons. First of all, there are not enough channels, not enough choice. They don't get to watch any of the cable news, they don't get to go to ESPN, don't get to watch the NFL draft for 46 hours. They wanted more choice.

Point number two, in rural America, those signals weren't reaching anyhow, so Americans said en masse, now nearly 90 percent, we're willing to pay as long as we get a competitive price, as long as it's a fair deal in terms of value, we'll pay for cable, we'll pay for satellite. That's what's happened.

There's no evidence that cable and satellite, now that they do compete since the Satellite Home Viewer Act allowed satellite to deliver broadcast signals, there's no evidence that affordability is the problem here for people. There are people who say, I don't really like TV, but we're down to such a tiny number of people for whom it is sincerely an affordability issue and they just can't afford it that it is perfectly possible to say with respect to that, we'll let states, we'll let localities, we'll let cable and broadcast have some money out of the spectrum, anything at all in order to close that gap if there's a real need, if there's something the equivalent of food stamps for being together in a national medium.

But what's absolutely clear are two things. You don't need legislation. You just need to sign, with all due respect, a letter that is by everybody here to the FCC saying to all five members, and hopefully you all could get all five to agree in telling them the following things, read the law. When it says that 85 percent is enough to call the conversion over, then call it over, and 85 percent means 85 percent of the people in the households in the United States are receiving a digital signal, which they are, they are right now, either on cable or satellite. And if they don't want to buy a digital receiver to show it digitally, that's their choice. If they want to wait till the price goes down next Christmas, which it will, and it'll be lower the Christmas after that and lower still the Christmas after that, if they want to wait, let them wait.

Senator BURNS. I just switched to color.

Mr. HUNDT. I've got a black-and-white in the basement I'd be happy to offer here as an exhibit. They do never break, and that's one reason why people are taking their time about switching.

But your job has been accomplished. You wanted the digital signal out there, and through cable and through satellite, it is out there. So all we have to do is count the 85 percent right. This Committee negotiated that to a fare thee well in, I think, 1997, and it was a fair answer and just count it right.

Point number two. When you look at the spectrum that Mr. Gilder here pointed out quite accurately is the way to get these wireless broadband signals to go a long way in rural areas, it's just so costly to dig up trenches 3 and 4 and 5 miles long, too costly. In the rural areas, just say to people, at the FCC they just have to sign a little order, they just have to get the votes to sign a little order. Just say to people, where the spectrum in the 700 MHZ range is not being used, and as long as you promise that your technology won't interfere if it ever is used, as long as you make that promise, you can use this spectrum for wireless broadband. It's called a secondary use.

The engineers in the United States will go, I never knew there was a U.S. Government that was going to do something right. They don't even know that there is a U.S. Government, but to the degree that they could find out that good news, you would lower the cost of wireless broadband in one fell swoop by 50 percent. You'd go so far toward making it affordable for everyone. You'd accomplish so much toward the goal of universality that within a short period of time, we would be back her talking about what do we do about the last million people that wireless broadband doesn't' work for. That's the problem we want to have.

Senator NELSON. I had said thank you, but I just thought of something else. Technology is changing so fast, to get that person out there in a rural area with a telephone, you're not going to have to run a line out to them in the future. So can't we approach universality in a whole new way because of the changes in technology and do it a lot cheaper? Because you don't have the costs of running poles and lines for hundreds of miles.

Mr. HUNDT. Absolutely, yes.

Mr. GIFFORD. And I think, Senator, you're exactly right. But right now that's not the universal service system that we have and that's why I think when you look at the next act that you can think and reconceive universal service, look at things like reverse auctions to where you're getting that innovation out to the rural areas to where low-cost and low-priced innovators have the incentive if they need a subsidy to go out there and do it, which means you both reduce the universal service subsidy as a whole and bring rural America the advanced technology that you want to get out there.

Senator NELSON. Then a Senator like Senator Dorgan from a rural state ought to embrace the changes that you're talking about instead of being locked in the old definitions of universality.

Mr. GIFFORD. I would never want to tell Senator Dorgan what to think, but I do think there are dynamic ways to do universal service that recognize that there are some reliance interests of the incumbent rural phone providers, particularly the rural ILECs, which are highly dependent on the old legacy regulatory system of access charges, universal service subsidies. They have to be weaned from that and they have to realize that technologies like VoIP mean they're going to be weaned gently and seamlessly through a transition phase or very abruptly when there's no money in the till to subsidize them with.

Senator BURNS. But to follow up on that, and if the Senator would yield, my cooperative telephones and rural telephones have

done really a better job of getting more fiber in the ground and doing more about distance learning and two-way interact in rural areas than the RBOCs have done in areas where they had a more densely populated areas. And so they've done a commendable job and should be recognized for that.

But there's also a time, I am like Mr. Gilder, there is in universal service, there is a point of diminishing returns, and in fact, it may in some areas be boiled down to the fact to where it really limits and bars innovation and the deployment of new services. So there is a point there.

Senator NELSON. That's what it seems to me, Mr. Chairman, that we got to break out, not the fact that your telephone companies have put fiber optic cables in the ground, but what's the most cost-efficient, good service for the future for your rural constituents.

Senator BURNS. Well, the thing about it is, the reason they did that is because of the spectrum thing and the spectrum that they were allowed would not allow them to put the technology on there that would push that signal out a long way. So you also had to weigh that, and so we've been down that road.

Yes, sir?

Mr. THIERER. The way we might be able to solve this in the next Act is to once again reiterate the importance of making sure universal service is technologically neutral in character, and maybe the best way to do that is something that actually Senator McCain suggested many years ago, which is make the subsidy or assistance direct and targeted toward the end user, but let them decide how they're going to go and use that subsidy or assistance to maybe buy a line from their coop or from their RBOC or from a cable company or a cell phone.

Just yesterday in the Investors Business Daily, the latest stats came out on cell phone users who have cut their cord entirely. It's up to just 5 percent, but that's still impressive, but it's estimated to go up to 30 percent by 2008.

Senator NELSON. I couldn't hear you. Cut their what?

Mr. THIERER. Cut their cord, their wire entirely, who are completely wire free now, and this includes a lot of people in rural communities.

Senator NELSON. I have a son and daughter that's done the same thing.

Mr. THIERER. And when I go back to my old farm home in rural Illinois, I see that people have cell phones everywhere. That may be the better way for the truly needy is to deliver that assistance. It might even be something that the states could administer better than the Federal Government and allow that sort of targeting to take place and that solves our problem in a technologically neutral fashion.

Senator BURNS. Senator Cantwell. Sorry I didn't get to you there.

Senator CANTWELL. Thank you, Mr. Chairman. I appreciate it. Gentlemen, I don't think anybody's asked about CALEA. One thing that I would like to ask, I guess starting with you, Mr. Hundt. There obviously is now a petition before the FCC by DOJ and the FBI on what I equate to basically putting a network architecture into the infrastructure of the Internet and voiceover IP to get access. Are you concerned about that?

Mr. HUNDT. Yes. And I know you know, Senator, that this discussion has about 10 years of life in it already and——

Senator CANTWELL. It certainly does remind me of the Clipper chip, but yes.

Mr. HUNDT. Exactly. Let me mention something here that I think speaks to this, and that is a request for proposal that the City of New York has put out for how to create across New York a wireless broadband mesh network that will be absolutely secure, absolutely reliable, and will permit them at last to solve communications problems across their firemen and policemen and all their different public safety organizations.

Now, they have as much concern about security as anybody else does for tragic reasons that we all know. That proposal is a proposal in which they're saying to the hardware and software community of the world that you're so familiar with, tell us your solutions and we'll pick the one that meets our bid requirements and is the lowest price, and so systems integrators have gotten together and they've contracted out the security problem to different firms, I don't know who they all are because it's a sealed process but it will be revealed, and I believe that we will see in that process a very instructive experiment in a very important city with tremendous technology issues and security issues. And I think that will teach us a great deal about how to address all the security issues that the FBI and other agencies are constantly addressing here.

But here's the main thing about it, because I'm kind of riding this horse. That whole proposal is pitched for the unfortunately high frequencies in the spectrum chart because the FCC did not say you could put this in 700 MHZ, and so it's way up in the high frequencies and everything is more costly and more problematic.

Senator CANTWELL. Mr. Gilder, is there something unique about bits over voiceover IP that they shouldn't go before a judge to get access to? Is there something so unique about them that there's only one way to capture them and that is to have the FBI have a systems architect into the Internet?

Mr. GILDER. I think that the problem is that this technology is changing so rapidly, as you know, that any fixed solution enacted at this point and deployed over the next 5 years will be hopelessly obsolete by the time it's actually adopted.

So I think that there should be more freedom for the FBI and the police to conduct their own arms race with possible abusers of the system rather than trying to provide some specific technological change now that will be easily circumvented as time passes by miscreants. And so I think what's really critical is to understand we are in an arms race with terrorists and that we don't disarm our people and prevent them from using information technology, data mining, all the various techniques that are commonly used already by insurance companies and credit card companies and use some of this technology rather than try to have technical fixes that are going to be obsolete by the time that they're adopted.

Senator CANTWELL. I don't want to misinterpret your comments. So then you would be more in favor of the petition that's currently in front of the FCC?

Mr. GILDER. Yes. I'm not familiar exactly with what the petition is, so I can't discuss it in specific terms, but in general terms.

Senator CANTWELL. Maybe we could followup, because I think you're right, the task is difficult and the technology will continue to change and how do you keep them on top of it without giving them the—the three-legged stool of now going to a judge to get access is a pretty nice protection I think we'd like to keep. Thank you for your testimony in general, Mr. Gilder. I love your term lobby-gagging, political lobby-gagging. I didn't realize that was a term but I don't know if you used it in your oral testimony but it's in your written testimony.

You discuss a lot the layer concept, which we had a little bit of opportunity to talk about yesterday, and I think I'm understanding what you were trying to articulate, you're saying, don't make the same mistakes of trying to over regulate, don't try to come up with a framework, because it is moving so fast.

But what then would you establish as you call it, the bright line? What would be your structure or bright line that you think we would have to have, or are you just saying, just get rid of the 1996 Act and just let the market roll?

Mr. GILDER. I'm for letting the market roll. There are plenty of laws out there. If serious abuses or monopolies or fraud or all of the vast array of laws that we have are ample to prevent any significant danger from the abolition of this huge regulatory maze that has paralyzed our progress and left us 11th in the world, I think actually massively behind the Asians in per capita bandwidth to homes and business.

Senator CANTWELL. Do you think everybody's going to end up in the same business, the various players, the telcos, the cable industries? Everybody's going to end up basically providing the same services, the same bits, per se?

Mr. GILDER. Right. And there are going to be lots of advances. Some of it's going to be vertically integrated, they're going to be all optical networks with wireless access. I think that'll probably be the optimal solution, but I don't want to prescribe it myself, because I think there will be other technologies now that they're proposing power line delivery. I mean, there are just so many different ways to render this particular arena the single most competitive arena in the entire global economy, that the idea that you need a special set of rules to protect consumers is obsolete.

Senator CANTWELL. And as the competition—and I think in your testimony you basically say that people will then integrate, we won't have to worry about open access, we won't have to worry about competition, it'll just take care of itself.

Mr. GILDER. Yes. I believe that. I don't think you make money by depriving people of goods and services.

Senator CANTWELL. And so do you worry about one or two big players?

Mr. GILDER. No. I think there are ample players. This is a global economy. You have to compete with companies all around the world, and I think, I'm not at all worried about one or two players.

Senator CANTWELL. So we don't get all our bits from one person, one entity in the future?

Mr. GILDER. Not unless the government mandates some continued balkanization and creates a whole area of monopolies and prevents the vertical integration which is absolutely always the first

step in the introduction of new technologies. It's always going to be vertically integrated and a monopoly within its own defined sphere, but the competition comes and competing among the spheres. Google will be competing with Verizon with Deutsche Telekom with Time Warner. It's just going to be a general competitive industry which happens to be the central industry of the world economy, and thus, it's appropriate that it be free.

Senator CANTWELL. Well, I think it's a very interesting point. I don't think that when Vocal Tech brought its first petition or when the first petition was brought before the FCC on IP telephony, I think that was probably like 1995, I don't think everybody thought we'd be sitting here today with everybody going to be in the voiceover IP business. And yet the FCC could have ruled at that point in time on Internet telephony and made some decisions, so I think your point is right.

And I just want to clarify, I think you're saying then about these issues that we sometimes get obsessed with back here on things like universal service, your exchange with one of my colleagues, you think that will take care of itself.

Mr. GILDER. I really do. I mean, think of TV. You didn't have a universal mandate for TV and universality was achieved a lot faster with TVs than with telephones despite the universal service mandate.

Senator CANTWELL. OK. Any other panelists like to comment on that vision of the future by Mr. Gilder?

Mr. FERGUSON. I guess I would in principle agree with George, if antitrust law and enforcement were absolutely perfect, frictionless and instantaneous, but as we all know, they're not. It was an antitrust action that led to the breakup of the original AT&T and that gave us competition in long-distance service and in telecommunications equipment. The last mile is basically the last piece of unfinished business in the American high technology economy, and it's a gigantic critical bottleneck.

If we were simply to deregulate the current incumbents without any effort to promote competition, to enforce competition, then what we would almost certainly get would be a duopoly in residential broadband service and in most cases, a single dominant telephone company in business broadband services. And both of those companies, both members of the duopoly in the case of residential service would have extremely strong incentives not to improve their broadband services, because the logical result of doing so would be the obliteration of their current entrenched monopoly businesses.

In the case of the telephone companies, voice telephone service, including enhanced services, cost far more than it should and proper Internet-based technology riding a 50 percent per year improvement in broadband services delivered to homes would result in extremely drastic reductions in the price of voice telephone service over the next 5 years and the same would happen with regard to broadband services, real broadband services, which are currently extortionally expensive in the United States, and are showing no improvement or very little improvement in cost performance and haven't shown any improvement over the past decade.

In the case of the cable industry, the broadcast HDTV standard requires 19.2 megabits per second. Once you get to 30 or 40 mega-

bits per second over a wire, you can deliver HDTV over the Internet and the utility of having a cable television monopoly declines rather precipitously.

Both of these industries have shown absolutely no propensity to cooperate with—excuse me, to compete with, slip of the tongue there—to compete with either each other, except in the very limited case of residential broadband service, or to compete with other members of the same industry. Not a single incumbent telephone company has invaded the territory of any of the others or competed with any of the others in market whatsoever.

Mr. GILDER. Except wireless, right?

Mr. FERGUSON. No. In wireless they do not compete with each other.

Mr. GILDER. Cingular and Verizon?

Mr. FERGUSON. Cingular and Verizon have begun to compete with each other in a very limited way. They still do not offer primary service in the others' operating areas, and if you look at their ownership structures, you can see why. They are being forced gradually to increase their competition with each other by competition from others in the wireless market, which made their duopoly status unsustainable, and that is what we should and must do in the broadband case.

If we had the same kind of system that every other nation that leads us in broadband deployment has, namely obligatory resale and serious competition among multiple competitors using the lines, the least lines of the incumbents, that's what works in Japan, it's what works in South Korea, it's what works in Canada, which has unbundled both its telephone and its cable infrastructures, if we had that, then, yes, the incumbents would begin to really compete with each other.

Senator CANTWELL. Mr. Gilder, is Mr. Ferguson looking at a shorter-term view of the future and you a longer-term view?

Mr. GILDER. Yes, and I also, I don't agree that, in Korea, most of the fiber runs directly to the apartments or the basements of these big apartment buildings and then they have a variety of connections up through the apartment buildings, and there are only a couple of carriers in Korea and they don't exploit each other's lines very much. It's not a major factor in Korea. It was a bigger factor in Japan because they only had one carrier essentially, NTT.

Senator CANTWELL. Mr. Thierer, did you want to comment?

Mr. THIERER. Yes, please. Senator, I think it's very important we recognize the fact that in a network industry like communications and broadband, we're not going to have the same economics as a corner lemonade stand. There are not going to be hundreds or thousands of small Mom and Pop providers in this industry ever.

But it doesn't mean with three or four very large integrated providers we can't have true, facilities-based competition. And when we talk about the threats of monopoly and last miles, I always pull out my cell phone and say there's my last mile right there. My last home had two satellite dishes and two cell phones. I didn't have any wires and I got rid of that and I went to a new house and now I have wires again. Those are choices we'll have between maybe two or three or hopefully four major competitors. That is a realistically competitive marketplace. I do not believe that a marketplace

based on mandatory unbundling and infrastructure sharing across the board can get us to that future, and it just pretends that we'll have sort of hypothetical competition among a lot of smaller players trying to squeeze a lot of juice out of the same old lemon. Let's go with entirely new wires for maybe three or four highly integrated providers.

Mr. HUNDT. If I might, Senator, the reason that telephone exists and works and does the things that Adam is saying is because this Congress in 1993 passed a law ordering that the FCC make the spectrum available for the company to buy it on auction, to then use that spectrum to build the network, and now he's locked into the technologies on his telephone. Yes, they will evolve, but they're not going to change on the frequencies, and the reason they're not going to change on the frequencies, and the reason he doesn't get good reception inside buildings is because there was lock-in for decades because the only spectrum that was given for that was roughly 2.1 GHZ.

Industries have lock-in. When you write a million lines of software code, I know you know this better than I, when you write a million lines of software code, you don't then say for the next patch, I'm going to write the whole thing all over again. You're locked in to the architecture that you start with.

The reason we don't have fiber networks in the United States but have copper instead was not because everybody was just dumb, but because when we built our networks, copper was the medium of choice because people hadn't invented the optical technologies that George and others here have written about.

So what I'm saying about wireless broadband is, let us not lock in this new technology to what is not the right frequency, what is the high cost solution, and what is the way to make sure that it goes as slow as possible and expensive as possible and reaches the smallest number of people.

Let's instead say to wireless broadband, we're going to let you use the spectrum that long ago, 60 years ago, we said was the primary spectrum for tying everybody to the common medium of that age, which was broadcast TV. Broadcast TV didn't just happen universally without the government. It happened because the government stepped in, made some mistakes, but by and large got it right in the sense that it said in every single city and town in the United States, more than 400 separate allocations of spectrum, it said to individuals in those towns, you have the legal right to use this spectrum and put up a tower and it's the right spectrum for getting the signal out over a certain distance, and so the framework of universality was created, even as the technology of the TV transmission and receiver was being invented and the standards were set, and we had the same standards for years and years and the costs went farther and farther down. That's how we got universality.

There were lots of mistakes, but by and large, it was a relatively perfect marriage between a plan for spectrum use that the government presided over and technology innovation. The reason that era's over is that, as you know, we've gone digital, and now we need that spectrum at the higher ends to be used for these new technologies. And if we don't do that now, it is not going to get

easier later. It will be impossible later because we'll be locked into the wrong spectrum choices.

Senator CANTWELL. Thank you, and thank you, Mr. Chairman. I know I've been long over my time and I'm sure this debate could go on, and perhaps it should in a different forum, because I think really this is at the crux of how we—it's not necessarily about just getting rid of the 1996 Act, it's what's the framework by which we look at the new world emerging before us, and is that more of a hands-off approach, and if that's so, is it totally hands-off?

So anyway, it's been an interesting answers. Thank you very much and thank you, Mr. Chairman.

Senator BURNS. Well, do you have another question? I think we've squeezed all out of this onion that we could get in one day. I want to thank the witnesses today and their testimony and their views. I'm sure you'll be asked again as we debate this, because I think I can see a very exciting next 2 years coming up as far as this issue is concerned, and being that we've got everything out of this onion that we can get, this hearing is closed.

[Whereupon, at 11:30 a.m., the hearing was adjourned.]

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