

WIRELESS ISSUES AND SPECTRUM REFORM

HEARING

BEFORE THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

MARCH 14, 2006

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

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WIRELESS ISSUES AND SPECTRUM REFORM

TUESDAY, MARCH 14, 2006

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

The Committee met, pursuant to notice, at 10 a.m. in room SD-106, Dirksen Senate Office Building, Hon. Ted Stevens, Chairman of the Committee, presiding.

OPENING STATEMENT OF HON. TED STEVENS, U.S. SENATOR FROM ALASKA

The CHAIRMAN. Thank you for coming. We obviously will not have the presence of the Co-Chairman today, after his sad loss yesterday. This is the tenth in the series of hearings on communications. Today, we want to look at various wireless issues, including the use and management of spectrum. Spectrum is one of our most important national resources. Americans increasingly rely on its use daily for family communications, work, education, and entertainment. Moreover, wireless services are essential to the ability of first responders and the military to save lives and protect our homeland. In the past, Congress has responded to advances in technology and changes in the communications market by updating laws concerning the use and management of spectrum. In 1993 Senator Inouye and I participated in moving legislation through Congress that directed the FCC toward licenses by auction. And earlier this year, Congress set a hard date of February 17, 2009, for the DTV transition, which will provide spectrum for public safety and wireless broadband service able to reach rural America. As part of the DTV legislation Congress at our request extended the FCC's auction authority to September 30, 2011. Senator Allen and I have proposed legislation that will allow unlicensed wireless devices to provide new services over the unused or white spaces of television's broadcast spectrum, so long as such devices did not cause harmful interference to TV service. Today, we hear whether Congress needs to address any particular wireless issue or further address spectrum reform. We have two panels. Let me call the first panel to the table if you will. Catherine Seidel, Acting Bureau Chief, Wireless Telecommunications Bureau of the FCC. Mr. John Kneuer, Acting Assistant Secretary for Communications and Information of NTIA. JayEtta Hecker, Director of Physical Infrastructure of the U.S. Government Accountability Office, GAO. While you are there, let me turn to my colleague here, Senator Dorgan.

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

Senator DORGAN. Mr. Chairman, thank you very much. As is always the case there are competing hearings. We have an appropriations subcommittee hearing going on in another room, so I won't be at all of this hearing. But I wanted to come by. First, let me say I know all of this Committee feels terrible about Senator Inouye's loss and the death of Mrs. Inouye is a real blow to the U.S. Senate. And our thoughts and prayers are with Senator Inouye today.

As Co-Chair of the congressional wireless caucus, along with Senator DeMint and with Congressman Pickering and Wynn, we are very interested in these new wireless technologies and what they can mean for our country. I have always felt, Mr. Chairman, and perhaps the same is true with you, coming from Alaska, that many new technologies offer promise to provide additional service to rural areas of the country. And I believe wireless certainly does that and is a technology that I want to embrace to help expand further deployment of broadband to rural areas, which is so very important. And I support wireless for that purpose.

I also support Senator Snowe's bill to promote auctioning off spectrum in smaller geographic areas so that rural carriers can more easily access spectrum. And I also support the legislation you just described to free up unused spectrum for unlicensed wireless use.

There is a lot happening in this area, including, Mr. Chairman, the issue of concentration, which ought to be a concern for us and also for the FCC. I was on the Committee in 1996 when we wrote the Telecommunications Act. The world has changed since then. I mean, it is an unbelievably different landscape since that time, but one relentless push has been concentration. Concentration in virtually every area of communications, including a recent announcement in the last week or two about another very, very large merger. So, I think as we talk about the technology and the use of spectrum, we also need to think about this issue of concentration and what it is going to mean to the landscape, if unchecked five and 10 years from now, but again I think this is the right hearing to have. I appreciate, Mr. Chairman, your willingness to proceed to have this hearing and I look forward to hearing from the witnesses.

The CHAIRMAN. Thank you very much, Senator.
Senator Lautenberg?

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

Senator LAUTENBERG. Mr. Chairman, this is an appropriate time to call this hearing, given the serious interest of what is happening with spectrum. I think it leaves us notably behind other countries. And we all share an interest in expanding telecommunications and broadband to every corner of the United States. If we plan to remain competitive in this technologically connected world, we can't afford to miss any opportunities to provide information to every American wherever we can do so. High speed Internet is a 21st century utility, one that obviously not only improves communication, education and, of course, the economy. Now many Americans

don't have broadband because they live in smaller towns and coming from the most densely populated state in the country, it seems challenging to talk about smaller towns. We have a lot of them in New Jersey and they need to have these services available. And where a company won't make it available or they simply can't afford broadband services, we have to help that availability. And that is why unlicensed spectrum offers so much promise. It is an important resource. It can provide a catalyst for broadband deployment in all parts of the country, both urban and rural. And already we have seen unlicensed spectrum at work in our local coffee shops or the public park in the middle of town. On a larger scale, cities and towns across the country are using unlicensed spectrum to aid their residents by creating their own municipal networks. And we should embrace this effort, which is why I was pleased to join Senator McCain to introduce the Community Broadband Act to make sure local communities can continue to make broadband available for all their residents. But that is only one piece of the puzzle. Greater availability of unlicensed spectrum could improve the speed and reliability of these networks while reducing costs to consumers. Obviously, large parts of the spectrum are and should be reserved for government and business, but the airwaves are, after all, a public resource. Unlicensed spectrum can be used to promote the public interest. As for portions of the spectrum that are auctioned commercially, we have got to ensure that women-owned and minority businesses are getting equal opportunities. It is quite unclear as to whether or not this is happening. I look forward to hearing from our witnesses and perhaps we can get some light shed on these issues. Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you, Senator, for the information of all the witnesses, your statements that you presented will be printed in the record in full. We would appreciate it if you could keep your statements as short as possible. We do want to hear you though because we are winding down now on these hearings. We have got these hearings today and we are going to have one more hearing, I believe. We have one this afternoon and then one in addition to that. We will then complete our series of some 17 hearings on communications. So our first witness is Catherine Seidel, Acting Bureau Chief of the Wireless Telecommunications Bureau with the FCC. If I have my way, we will drop the "Tele" and just talk about communications from that. Now, Ms. Seidel.

STATEMENT OF CATHERINE W. SEIDEL, ACTING BUREAU CHIEF, WIRELESS TELECOMMUNICATIONS BUREAU, FEDERAL COMMUNICATIONS COMMISSION

Ms. SEIDEL. Good morning, Chairman Stevens, Members of the Committee. I am Cathy Seidel, Acting Chief of the Wireless Bureau at the FCC. I appreciate the opportunity to appear before you today to discuss wireless issues and spectrum reform.

The central focus of the FCC's early spectrum policy and regulation was management of the problem of interference among the adjacent spectrum users. Initially, the FCC sought to address this problem by employing a prescriptive, band-by-band approach whereby it allocated spectrum blocks to limited categories of spec-

trum users for a specific service subject to detailed and restrictive service rules.

Spectrum policy, however, must keep up with the pace and innovation in wireless technologies to increase opportunities for technologically innovative and economically efficient spectrum use. The FCC has sought to move its spectrum policy toward more flexible and market-oriented regulatory models, both licensed and unlicensed, as alternatives to more traditional spectrum regulation. The licensed model has focused on providing exclusive, more easily transferable licensed rights to flexible use frequencies, subject to limitations on harmful interference. The Commission has also used the “commons” or “open access” model, which allows users to share frequencies on an unlicensed basis, with the usage rights that are governed by technical standards, but with no right to protection from interference.

Because each of these models offers benefits to spectrum users and the public, the Commission has sought to apply them in a balanced way, rather than attempting to rigidly apply a single regulatory model. This balanced approach has yielded positive results and given service providers the freedom they need to develop innovative new service offerings and to structure their network efficiently.

Wireless communications are also vital to the Federal, state and local authorities responsible for maintaining public safety and responding to emergencies. Accordingly, the Commission has taken steps to ensure that public safety authorities have access to sufficient spectrum to meet their needs. Over the past year, the Commission has continued to dedicate significant effort to implementing a reconfiguration of the 800 MHz band. The Commission is also addressing whether public safety broadband communications can be accommodated within the current 24 megahertz of public safety spectrum in the 700 MHz band.

Another essential aspect of the FCC’s role as spectrum steward is to promote the use of spectrum to provide wireless voice and data services throughout the country, including rural and hard-to-serve areas. Over the past year, the Commission has implemented a number of policies in order to fulfill this goal. For example, the Commission reconsidered its band plan for the Advanced Wireless Service to ensure that it contains a mix of spectrum block sizes and geographic license areas. The revised band plan provides additional spectrum for licensing on a smaller geographic area basis, both to promote entry by smaller and regional carriers, and to provide all potential bidders with the flexibility to obtain spectrum in the increments that best suit their needs.

A central foundation of the Commission’s spectrum management policy is the mechanism it uses to award spectrum licenses. Since 1993, when Congress authorized the Commission to assign licenses through competitive bidding, the Commission has used auctions to assign commercial spectrum. All FCC licenses are subject to auction except public safety, public broadcasting, and international satellites.

The Commission’s experience has shown that auctions efficiently distribute spectrum to the applicants that value it most and compensate the public for use of a valuable and scarce resource. In the

years since we received auction authority, bidders have won over 28,500 licenses at auction, and paid over \$14.5 billion to the General Fund of the U.S. Treasury.

Later this year, the Commission will conduct several significant auctions, including the auction of 4 megahertz of spectrum in the 800 MHz band for new nationwide air to ground services, and the auction of 90 MHz of paired spectrum for the Advanced Wireless Service.

We are also taking steps to implement Congress's directive with respect to the auction of commercial spectrum in the 700 MHz band that is being made available by the digital television transition.

In granting the Commission the authority to assign license by competitive bidding, Congress directed that we ensure that small businesses have the opportunity to participate in the provision of spectrum-based services. To achieve this mandate, the Commission has established various incentives to provide small businesses with opportunities to participate in auctions. As the Commission's spectrum policies have developed we have repeatedly examined these incentives to ensure that our rules achieve their purpose of promoting opportunities for small businesses without unintended consequences. Currently, the Commission has an open rulemaking examining proposed modifications to the Commission's rules regarding relationships between small businesses and large communications providers.

In its regulation of the wireless industry generally, the Commission has relied largely on competition to drive innovation, lower prices, and protect consumer interests. This light-handed approach has produced robust competition in the commercial wireless sector, to the benefit of consumers. In the past 5 years, the number of subscribers to commercial mobile services has more than doubled from 97 million in June of 2000 to 195 million in June of 2005. Mobile telephones have gone from high-end luxury services to commonly available communication devices. In addition to providing voice services, wireless providers are increasingly bringing broadband capability to subscribers in the places where they live and work.

Finally, although the Commission has taken a light-handed regulatory approach to wireless regulation, the government continues to play an important role in setting rules for the spectrum use, and in national consumer protection issues. For example, the Commission has implemented regulations to ensure that individuals who use hearing aids have access to wireless services and that all wireless consumers have access to enhanced 911 and local number portability.

Thank you for the opportunity to testify before you today regarding wireless issues and spectrum reform. I would be happy to answer questions.

[The prepared statement of Ms. Seidel follows:]

PREPARED STATEMENT OF CATHERINE W. SEIDEL, ACTING BUREAU CHIEF, WIRELESS
TELECOMMUNICATIONS BUREAU, FEDERAL COMMUNICATIONS COMMISSION

Introduction

Good Morning Chairman Stevens, Co-Chairman Inouye, and Members of the Committee. I appreciate the opportunity to appear before you today to discuss wireless issues and spectrum reform.

In my testimony, I will describe briefly the background and development of the Federal Communications Commission's (FCC) spectrum and other regulatory policies for wireless services. I will also discuss our efforts to implement these policies to license and manage the Nation's non-Federal spectrum resources and wireless services.

Background

As you know, the FCC is an independent agency charged with regulating interstate and international communications by radio, television, wire, satellite and cable. The FCC's role is to regulate non-Federal use of electromagnetic spectrum, while the National Telecommunications and Information Administration (NTIA) oversees Federal use of spectrum. The two agencies work cooperatively to encourage sharing of spectrum when possible, and to transition spectrum use between Federal and non-Federal users.

I am Cathy Seidel, Acting Chief of the Wireless Telecommunications Bureau. Under the direction of Chairman Martin and the Commissioners, the Bureau oversees the use of spectrum for domestic terrestrial services. In developing and implementing the Commission's spectrum policy, we collaborate with our colleagues in the Office of Engineering and Technology, which oversees spectrum allocation for non-Federal use, the Media Bureau, which oversees broadcast radio and television services, and the International Bureau, which oversees satellite services.

Spectrum Management

The central focus of the FCC's early spectrum policy and regulation was management of the problem of interference among adjacent spectrum users. Initially, the FCC sought to address this problem by employing a prescriptive, band-by-band approach whereby it allocated spectrum blocks to limited categories of spectrum users for specific services subject to detailed and restrictive service rules.

Spectrum policy, however, must keep up with the dizzying pace of change and innovation in wireless technologies. In the last several decades, wireless technology has advanced rapidly, bringing new services and capabilities to the American people. These technological advances create the potential for systems to use spectrum more intensively than in the past. The Commission's challenge has been to accommodate more intensive spectrum use while ensuring that existing spectrum users are protected from harmful interference.

To increase opportunities for technologically innovative and economically efficient spectrum use, the FCC has sought to move its spectrum policy toward more flexible and market-oriented regulatory models, both licensed and unlicensed, as alternatives to more traditional spectrum regulation. The licensed model has focused on providing exclusive, more easily transferable licensed rights to flexible-use frequencies, subject to limitations on harmful interference. The Commission has also used the "commons" or "open access" model, which allows users to share frequencies on an unlicensed basis, with usage rights that are governed by technical standards, but with no right to protection from interference.

Because each of these models offers benefits to spectrum users and the public, the Commission has sought to apply them in a balanced way, rather than attempting to rigidly apply a single regulatory model to all spectrum. This balanced approach has yielded positive results. Wireless licensees have provided consumers with advanced mobile communications capabilities through use of exclusive and technically flexible licenses. Unlicensed services, on the other hand, have provided a wealth of innovation recently. Both models have proven valuable because they give service providers the freedom to develop innovative new service offerings and to structure their networks efficiently.

Wireless communications are also vital to the Federal, state and local authorities responsible for maintaining public safety and responding to emergencies. Accordingly, the Commission has taken steps to ensure that public safety authorities have access to sufficient spectrum to meet their needs. Over the past year, the Commission has continued to dedicate significant effort to implementing a reconfiguration of the 800 MHz band to eliminate interference problems caused by the historical interleaving of public safety and commercial wireless channels in the band. The Commission is also addressing whether public safety broadband communications

can be accommodated within the current 24 megahertz of public safety spectrum in the 700 MHz public safety band.

Another essential aspect of the FCC's role as spectrum steward is to promote the use of spectrum to provide wireless voice and data services throughout the country, including in rural and hard-to-serve areas. Over the past year, the Commission has implemented a number of policies in order to fulfill this goal. For example, the Commission reconsidered its band plan for the Advanced Wireless Service to ensure that it contains a mix of spectrum block sizes and geographic license areas. The revised band plan provides additional spectrum for licensing on a smaller geographic basis, both to promote entry by smaller and regional carriers, and to provide all potential bidders with the flexibility to obtain spectrum in the increments that best suit their needs. This band revision builds on other Commission policies intended to increase the efficiency and flexibility with which service providers can obtain access to spectrum in rural areas, including permitting licensees to partition, disaggregate, and lease their spectrum in secondary market transactions.

Auctions

A central foundation of the Commission's spectrum management policy is the mechanism it uses to award spectrum licenses. Since 1993, when Congress authorized the Commission to assign licenses through competitive bidding, the Commission has used auctions to assign commercial spectrum. All FCC licenses are subject to auction except public safety, public broadcasting, and international satellites.

The Commission's experience has shown that auctions efficiently distribute spectrum to applicants that value it most and compensate the public for use of a valuable and scarce resource. In the years since we received auction authority, bidders have won over 28,500 licenses at auction, and paid over \$14.5 billion to the General Fund of the U.S. Treasury.

Later this year, the Commission will conduct several significant auctions, including:

- *Air-Ground*—The auction of four megahertz of spectrum in the 800 MHz band for new nationwide air-ground services is scheduled to begin on May 10, 2006. For this spectrum, the Commission has developed a flexible licensing approach, offering three alternative band plan configurations. Thus, the band will ultimately be configured and licenses will be awarded based on the band plan that receives the highest aggregate bid.
- *Advanced Wireless Service*—On June 29, 2006, the auction of 90 MHz of paired spectrum in the 1710–1755 and 2110–2155 MHz band is scheduled to begin. The Commission has adopted flexible service rules for the Advanced Wireless Service, to promote innovation and development of next-generation services and capabilities in the band. Notably, this auction will occasion the first use of the Spectrum Relocation Trust Fund. Established by Congress in the Commercial Spectrum Enhancement Act, the Trust Fund allows the use of auction proceeds to reimburse Federal agencies for the cost of relocating existing operations in the 1710–1755 MHz band. Another potential change to the Commission's auction processes that could facilitate the transition of non-Federal incumbent spectrum users in future auctions would be the use of “two-sided auctions” or “auction vouchers.”

We are also taking steps to implement Congress's directive with respect to the auction of commercial spectrum in the 700 MHz band that is being made available by the digital television transition. Congress has recently passed legislation directing the Commission to begin an auction for this spectrum no later than January 28, 2008. This spectrum is particularly well-suited for wireless broadband uses, and promises to yield significant benefits and innovative services for consumers.

In granting the Commission the authority to assign license by competitive bidding, Congress directed that we ensure that small businesses have the opportunity to participate in the provision of spectrum-based services. To achieve this mandate, the Commission has established various incentives, such as bidding credits and spectrum set-asides, to provide small businesses with opportunities to participate in auctions. As the Commission's spectrum policies have developed, we have repeatedly examined these incentives to ensure that our rules achieve their purpose—promotion of opportunities for small businesses—without unintended consequences. Currently, the Commission has an open rulemaking examining proposed modifications to the Commission's rules regarding relationships between small businesses and large communications service providers.

Wireless Service Regulation

In its regulation of the wireless industry generally, the Commission has relied largely on competition to drive innovation, lower prices, and protect consumer interests. This light-handed approach has produced robust competition in the commercial mobile wireless sector, to the benefit of consumers. In the past five years, the number of subscribers to commercial mobile services has more than doubled from 97 million in June 2000 to 195 million in June 2005. Mobile telephones have gone from high-end luxury services to commonly available communications devices. In addition to providing voice services, wireless providers are increasingly bringing broadband capability to subscribers in the places that they live and work.

Although the Commission has taken a light-handed regulatory approach to wireless regulation, the government continues to play an important role in setting the rules for spectrum use, such as protection from harmful interference. The government also plays an important role in national consumer protection issues. For example, the Commission has implemented regulations to ensure the hearing disabled have access to wireless handsets and that all wireless consumers have access to enhanced 911 and local number portability.

Conclusion

Thank you for the opportunity to testify before you today regarding wireless issues and spectrum reform. I would be pleased to answer any questions.

The CHAIRMAN. Thank you very much. The next witness is John Kneuer, Acting Assistant Secretary for Communications and Information of NTIA. Pardon me, Senator Lott, did you wish to make an opening statement?

Senator LOTT. No, thank you, Mr. Chairman.

STATEMENT OF JOHN M.R. KNEUER, ACTING ASSISTANT SECRETARY FOR COMMUNICATIONS AND INFORMATION, NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (NTIA)

Mr. KNEUER. Thank you, Chairman Stevens, Members of the Committee, for inviting me here to testify about NTIA's role in spectrum management and reform. My name is John Kneuer; I serve as the Acting Administrator at NTIA.

NTIA's responsibilities in general include, advising the Secretary of Commerce and the President on telecommunications policy matters, as well as managing the Federal radio spectrum. It is really the intersection of these two roles, telecommunications policy and spectrum management that has been the focus of NTIA during the Bush Administration.

We have strived to make additional spectrum available, both on an unlicensed basis and a licensed basis to ensure that there is adequate spectrum for competitive services and new technologies, but at the same time making sure that we continue to maintain access and preserve the ability of critical Federal missions, public safety, homeland security, and our national defense.

I would like to talk about three recent experiences that we have had that have really underscored the challenges of balancing these competing interests. Working with the FCC, we were able to identify 90 MHz of new spectrum to be licensed through an auction scheduled for this June, for advanced wireless services, that required the relocation of the Federal systems that were in those bands. We also worked to come up with a technical solution to allow unlicensed broadband wireless devices, WiFi-like devices, to co-exist in the 5 GHz band with spectrum that had previously been for the exclusive use of Federal radar systems.

Last, we worked again with the FCC to come up with technical rules to allow for the introduction of a brand new technology, ultra-wideband (UWB). UWB operates across huge bands of spectrum that are reserved for Federal and non-Federal systems, very challenging to our spectrum policies. Each of these proceedings, while they were ultimately successful, really underscored the challenges and the limitations of our regulatory environment. In fact in 2003, the President observed that, "the existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use." It was based on that observation that the President launched his spectrum policy initiative. This is an inter-agency initiative that has four principal goals: (a) foster economic growth; (b) ensure our national and homeland security; (c) maintain the U.S. global leadership in communication technology development and to satisfy other needs, such as public safety, scientific research, and transportation infrastructure.

This morning I want to talk about some of the objectives and some of the accomplishments that we have been making in satisfying this initiative. It is important to recognize that this is not just an NTIA initiative; this is not just a Department of Commerce initiative; this is an inter-agency government-wide initiative. One of the things that underscores this is that in June of 2005, the Office of Management and Budget gave guidance to each of the Federal agencies, that beginning with the Fiscal Year 2007 budgets, the agencies are required to consider the economic value of the radio spectrum when they propose funding for a spectrum-dependent system in their budget. This is a big deal. This is the first time that agencies and the Federal Government don't just look at spectrum as a free resource, when they are making their plans on building new systems and presenting their budgets. They need to recognize the economic value and the opportunity costs in that regard. To underscore this point the Department of Defense has made great strides working in this regard. DOD really led the way in coming up with their systems and their plans in this regard, not just in the capital planning process, but the Department of Defense has been a very strong partner of ours in the initiative and advancing the state of radio art. So I wanted to give them their credit in that regard.

While the initiative is not limited to the Department of Commerce, we do have a significant role. In May of last year, we submitted to the White House an implementation plan that laid out dozens of steps that we will undertake to meet the President's initiative. Let me quickly just go through a few. The implementation plan itself is available on our web page and you can see all the different activities we are doing, but I thought I would underscore a few this morning.

We are identifying opportunities for sharing systems between Federal and non-Federal public safety systems. I think the experiences in the Gulf and Katrina and Rita really underscored the need for Federal, state, and local first responders, and public safety entities to work together, to communicate together, by identifying opportunities for us to partner together. We identify capital savings.

We don't need to build redundant systems. We identify spectrum savings and we clearly ensure continued interoperability.

We are also working on a strategic spectrum plan, I think GAO in their report called for increased planning, long range planning. Each of the agencies has supplied to NTIA, their long-range spectrum needs plans, and we are coordinating those into an overall Federal plan. For the first time, we will look at the Federal spectrum use in one holistic way, rather than individual agencies in that limited way. We are also working on producing a plan for bringing incentives to Federal spectrum use. The FCC has a number of tools at their disposal to bring market forces to create incentives for spectrum use, whether it is auctions or creating secondary markets, we are limited in our ability to get that done. In the Federal space, we are working on plans to come up with rational incentives. I think it is important we recognize that each of those, not every system, not every application, is the same. We can't have a one-size-fits-all approach. We should try to identify opportunities to bring market-based incentives as well as other incentives to increase efficient use of the Federal spectrum.

Finally, one of the recommendations that was included in the President's spectrum initiative was to work with the Congress to pass the Commercial Spectrum Enhancement Act, which would create a process where Federal entities are reimbursed for the relocation of their bands to clear up spectrum.

I want to thank you, Senator Stevens, for your leadership in getting that bill passed last year, because of that legislation the FCC will be able to auction that 90 MHz of spectrum this June and that auction will bring billions of dollars into the Treasury. It will give every wireless carrier the ability to be a broadband provider, and we think that is important. So, I want to thank you again for your leadership in that regard.

Thank you for my invitation. I am happy to take any questions.
[The prepared statement of Mr. Kneuer follows:]

PREPARED STATEMENT OF JOHN M.R. KNEUER, ACTING ASSISTANT SECRETARY FOR COMMUNICATIONS AND INFORMATION, NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION (NTIA)

Thank you, Chairman Stevens, Senator Inouye, and Members of the Committee, for inviting me here to testify about the National Telecommunications and Information Administration's (NTIA) role in spectrum management and reform. My name is John Kneuer, and I serve as the Acting Assistant Secretary for Communications and Information and Acting Administrator of NTIA.

Among its responsibilities, NTIA is the principal telecommunications policy advisor to the Secretary of Commerce and the President, and the manager of Federal Government use of the radio spectrum. Throughout the Bush Administration this intersection of telecommunications policy and spectrum management has been the key focus of NTIA.

By identifying new spectrum for both licensed and unlicensed services, and working with the Federal Communications Commission (FCC) to authorize entirely new services, NTIA has worked to ensure that commercial wireless services have adequate access to spectrum to compete with incumbents and provide new services to consumers, while at the same time preserving spectrum access for critical Federal systems and public safety services. Achieving this balance between commercial and government interests, while critical, has not always been easy in the current regulatory environment.

Three recent experiences underscore this challenge: (1) identifying 90 MHz of spectrum to be auctioned for licensed advanced wireless services; (2) finding a technical solution to allow unlicensed broadband systems to share spectrum with critical

government systems in the 5 GHz band; and (3) working with the FCC to accommodate ultra-wideband devices that operate across huge bands of both Federal and non-Federal frequency bands. While ultimately successful, the effort required to introduce these technologies exposed the limits of our spectrum management system.

Based on these experiences, in 2003, President Bush stated that “the existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use.” As a result, and in order to ensure that America has a spectrum policy for the 21st Century, President Bush established his Spectrum Policy Initiative. The objectives of this inter-agency Initiative are to:

- (a) foster economic growth;
- (b) ensure our national and homeland security;
- (c) maintain U.S. global leadership in communications technology development and services; and
- (d) satisfy other vital U.S. needs in areas such as public safety, scientific research, Federal transportation infrastructure, and law enforcement.

This morning I will highlight the progress that the Administration is making in spectrum management reform in implementing the President’s Spectrum Policy Initiative.

The President’s Spectrum Policy Initiative

The Secretary of Commerce chairs and directs the work of the President’s Spectrum Policy Initiative, which consists of two broad courses of activity: an inter-agency Spectrum Task Force, and regular public outreach. In June 2004, the Secretary of Commerce submitted two reports to the President, one with recommendations of the Spectrum Task Force, and one including recommendations submitted during public forums and in response to a public notice of inquiry.

In November 2004, the President issued his second Executive Memorandum on spectrum reform and directed the Department of Commerce, the Office of Management and Budget, and the Department of Homeland Security and other agencies to implement the recommendations included in the two reports. The following is a summary of the activities that the Department of Commerce, and certain other Executive Branch Offices and Departments, have undertaken to implement the recommendations.

Progress in Implementing the President’s Spectrum Policy Initiative

Capital Planning and Investment Control Procedures

The President directed the Office of Management and Budget (OMB) to “provide guidance to the agencies for improving capital planning and investment control procedures to better identify spectrum requirements and the costs of investment in spectrum-dependent programs and systems.” In June 2005, OMB instructed the Federal agencies to consider the economic value of radio spectrum when developing justifications for new spectrum-dependent systems, beginning with Fiscal Year 2007 budget requests. The Secretary of Commerce asked each agency to report on its progress on this directive.

Several agencies identified a number of potential improvements to capital planning and investment control procedures related to spectrum-dependent technologies. Each has begun the process of implementing these improvements. NTIA is now working with OMB and the Federal agencies to review the individual agency capital planning processes as they relate to spectrum-dependent investments. This review will identify best practices with the objective of defining a consistent approach for including spectrum in the Federal capital planning process.

Department of Commerce Progress

Pursuant to the November 2004 Executive Memorandum, the Department of Commerce is directed to complete various tasks to implement the recommendations set forth in the June 2004 Reports. These tasks include: (a) developing a plan to implement recommendations for which it is responsible; (b) producing a Federal Strategic Spectrum Plan; and (c) developing a plan to identify and implement incentives for more efficient spectrum use. There have been numerous accomplishments to date in meeting these tasks.

Implementation Plan: The President directed the Secretary of Commerce to establish a plan for the implementation of all other recommendations included in its June 2004 Reports. On May 30, 2005, the Department of Commerce transmitted this plan to the Executive Office of the President and has commenced working on the recommendations it set forth. This plan sets forth milestones and timelines for imple-

mentation of the Initiative over several years. Milestones and accomplishments to date include:

Policy and Plans Steering Group: In order to enlist the leadership of Federal agencies in the resolution of spectrum policy matters, the Department of Commerce established the Policy and Plans Steering Group, or PPSG, in January 2005. This advisory group is composed of top leadership officials, at an Assistant Secretary-level or equivalent, from the Federal agencies that are major users of radio spectrum. The PPSG advises NTIA's Administrator on spectrum policy and strategic plans. The PPSG has committed to resolve major contentious spectrum issues affecting Federal and non-Federal spectrum users. The PPSG first met in January 2005 and will hold its third meeting at the end of this month to provide input on the implementation of the Spectrum Policy Initiative's recommendations.

Commerce Spectrum Management Advisory Committee: The Department of Commerce chartered the Commerce Spectrum Management Advisory Committee in 2005. This Committee, organized pursuant to the Federal Advisory Committee Act, will consist of private sector experts in spectrum and spectrum policy. It will advise the Assistant Secretary for Communications and Information on a broad range of issues regarding spectrum policy and on needed reforms to domestic spectrum policies and management. This advice will include suggested reforms to facilitate the identification of spectrum for new technologies and services.

Improvement of Spectrum Management Processes: NTIA has laid out a program for the next five years to modernize and improve spectrum management processes. The program includes: (1) a review and improvement of our international spectrum management policies including the improvement of our World Radiocommunication Conference preparation process and the international policy and framework that could become barriers to the implementation of new spectrum efficient technologies; (2) standardization and implementation of methods and analysis tools to assess new technologies to reduce the time it takes to provide access to spectrum; (3) adopt a spectrum management career development program to maintain our expertise in adapting new technologies and using the spectrum more efficiently and effectively; and (4) application of modern information technology (IT) to provide more rapid access to spectrum and make the spectrum management process more effective and efficient.

Federal/Non-Federal Public Safety Demonstration Program: The Department of Commerce has identified a number of candidate pilot programs to test the operational and cost effectiveness of sharing spectrum and communications infrastructure among Federal, state and/or local governments. NTIA coordinated with Federal agencies to consider existing demonstration programs for use in the pilot program. NTIA is evaluating seven programs in accordance with selection criteria that include factors such as whether the program demonstrates cost-effectiveness of sharing, whether the program is in existence and funded, and whether the program operates within existing allocations.

Federal Strategic Spectrum Plan: As directed by the President, the Department of Commerce requested spectrum plans from 15 agencies. The agency plans include: (1) current and future spectrum requirements for future technologies or services; (2) the planned uses of new technologies or expanded services requiring spectrum over a period of time agreed to by the selected agencies; and (3) suggested approaches to meeting identified spectrum requirements in a spectrally efficient way.

NTIA is integrating these individual agency plans into the foundation for the development of a comprehensive Federal Strategic Spectrum Plan. It will address the fragmentation, shortage, interference and security issues related to spectrum used by public safety organizations. Additionally, the President called for the Department of Homeland Security's Spectrum Needs Plan in the Federal Strategic Spectrum Plan.

The President directed this plan to be completed within six months after receiving the agency plans. It will be completed this summer and will lay the foundation for spectrum management for the 21st Century.

Plan to Identify and Implement Incentives: The President also directed the Secretary of Commerce to develop a plan identifying and implementing incentives to promote more efficient and effective use of the spectrum, while protecting national and homeland security, critical infrastructure, and government services. NTIA's Incentives Plan is organized around projects at several stages:

Public Outreach: NTIA identified two tasks as part of its public outreach—a public workshop on economic and other incentives that it sponsored at the National Academy of Sciences, and a review of the use, or proposed use of, economic incentives in other counties. NTIA’s workshop was held on February 28 and March 1, 2006. This forum brought together world-renowned experts and spectrum managers to present and discuss ideas on how incentives could apply to Federal Government and commercial spectrum users. NTIA will use the information gained from this workshop to guide and inform development of further studies identified as part of the plan.

Spectrum Valuation: Economic incentives for more efficient spectrum use are based on the premise that spectrum rights have measurable value. NTIA plans to study methods to estimate the economic value for spectrum used by Federal agencies and the opportunity cost of government spectrum versus other uses.

Federal User Fees: NTIA proposes to study the possible effectiveness of user fees designed specifically to encourage Federal agencies to make more efficient use of spectrum, as well as questions regarding whether such fees would be effective or appropriate for Federal Government spectrum use.

Non-Fee Incentives: On the premise that positive incentives through the granting of greater rights are basic to economic approaches to spectrum management, NTIA plans to examine incentives other than fees for Federal users, including, for example, the feasibility of granting agencies tradable rights and allowing agencies to accept payment for, or otherwise benefit from, allowing others to access their spectrum.

Sharing: With new technologies offering advances in spectrum sharing, NTIA plans to examine increased sharing of spectrum among Federal agencies or between agencies and other uses. This inquiry will look at such issues as frequency availability for such systems, different dynamic spectrum access techniques, and preemptive spectrum rights.

Spectrum Rights and Secondary Markets: On a broader level, NTIA plans to study spectrum rights and how they apply to all spectrum users, including how the FCC and NTIA define rights, and what changes, if any, would be beneficial and practical. NTIA will explore ways to enhance secondary markets, including increasing technical flexibility, developing real time electronic trading mechanisms, and expanding the trading of spectrum to Federal as well as non-Federal users.

This Incentives Plan also reflects NTIA’s efforts to support the President’s legislative proposals on spectrum. The President in his Fiscal Year 2007 budget recommended: (1) the FCC’s auction authority, which was extended through Fiscal Year 2011 in the Deficit Reduction Act of 2005, be made permanent; and (2) new authority be given to the FCC to charge fees for unauctioned spectrum licenses and construction permits.

Spectrum Relocation Fund: The Department of Commerce is implementing the Commercial Spectrum Enhancement Act, which was passed by Congress and signed by the President in December 2004. This Act establishes a spectrum relocation fund for Federal agencies from the proceeds of an auction that is scheduled to be held by the FCC in June 2006. The fund streamlines the process for reimbursing Federal agencies that must relocate from Federal spectrum that is being reallocated to commercial use. NTIA has worked with the Federal agencies that operate microwave radio-relay communications systems in the 1710–1755 MHz band to identify the systems requiring relocation, to identify new microwave bands or non-spectrum options, such as fiber optics, and to make the relocation cost estimates. NTIA led the multi-agency activity, which resulted in identifying 2,240 microwave radio-relay systems that will be relocated, at a relocation cost of nearly \$936 million. The relocation-fund process has worked very well thus far, and the auction, referred to as the “Advanced Wireless Services” or “AWS” auction, is expected raise several billion dollars. New spectrum will become available by this process, and American consumers and businesses will reap the benefits of more bandwidth for mobile technologies. For business, this means greater productivity; and for the consumer, more choices and improved services. At the same time, Federal agencies will also benefit as they are able to upgrade their services and equipment.

Conclusion

Thank you again for inviting me to testify. I welcome any questions that you may have for me.

The CHAIRMAN. Thank you very much. Our next witness is Ms. Hecker of the GAO. Does any Senator have a time problem and wish to make a statement before Ms. Hecker speaks?

Senator KERRY. Mr. Chairman, that is very generous of you. Could I take advantage of that?

The CHAIRMAN. Yes.

**STATEMENT OF HON. JOHN F. KERRY,
U.S. SENATOR FROM MASSACHUSETTS**

Senator KERRY. First of all, thank you, Mr. Chairman. I thank the witnesses and thank you, Mr. Chairman for holding this hearing. I have heard you describe how reliable broadband connection in Alaska would make a difference for folks who are in remote areas and who need some economic opportunity. I could not agree with you more. There are just too many people who either don't have access to broadband Internet service or they can't afford it, one of the two. Almost 60 percent of the country is unconnected as a consequence. Despite the President's promise of ubiquitous broadband by 2007, we are clearly now well into 2006, short of that goal. Only 40 percent of the households in America are subscribing and it seems, incredibly, that the FCC is sitting on a rulemaking proceeding that will help correct these problems. I have been pleased to join in a bipartisan effort with Senator Allen, to sponsor legislation that will better utilize spectrum and accomplish that goal. I just think that this is the only way we are going to make real all of our talk about competitiveness and secure America's place in the marketplace.

What our legislation would do, Mr. Chairman, is enable entrepreneurs to provide affordable competitive high-speed wireless broadband in areas that have no connectivity. It does so by providing additional unlicensed spectrum, which is now spurring an outpouring of innovation and creates an affordable—and broadly available wireless broadband solution—for unconnected rural homes, small businesses and public safety agencies. It allows kids, parents, just a whole bunch of people to suddenly connect, who can't connect. We have specifically put in the bill a provision that will prevent any interference with licensed entities and to avoid any kind of spectrum clash or interference.

So I think that it is important not to have false arguments put in the way of this. I think this really could be helpful. So, Mr. Chairman, thanks so much for bringing the Committee together around this. It could not be more important to all of us. Thank you.

[The prepared statement of Senator Kerry follows:]

PREPARED STATEMENT OF HON. JOHN F. KERRY,
U.S. SENATOR FROM MASSACHUSETTS

Mr. Chairman, I thank you for holding this hearing. We often talk about the importance of greater broadband deployment—and it is time to set Federal policy that will encourage it.

I have heard you describe how reliable broadband connections in Alaskan villages could change the economic opportunities in those villages. I really believe you are on to something Mr. Chairman and I applaud your leadership on this issue.

Unfortunately, many people either do not have access to broadband Internet service or simply cannot afford it. Despite President Bush's promise of ubiquitous broadband by 2007—we are well short of that goal (currently 40 percent of households subscribe).

Incredibly, it seems that the FCC is sitting on a rulemaking that will help correct this problem. I am pleased to join Senator Allen in sponsoring legislation that seeks to better utilize spectrum and accomplish this goal.

I have talked repeatedly in recent months about broadband as a key to economic growth—a job creator—a tool for learning and innovation. Indeed, it is a central pillar of our long-term competitiveness.

Our legislation will enable entrepreneurs to provide affordable, competitive high-speed wireless broadband services in areas that otherwise have no connectivity.

It does so by providing additional unlicensed spectrum—which is spurring an outpouring of innovation and creating affordable and ubiquitous wireless broadband solutions—for unconnected rural homes, for small business, for public safety agencies, and more.

It is my hope Mr. Chairman that we can come to agreement for a timely mark-up of the Allen/Kerry bill.

The CHAIRMAN. Thank you very much. Ms. Hecker.

**STATEMENT OF JAYETTA Z. HECKER, DIRECTOR, PHYSICAL
INFRASTRUCTURE ISSUES, U.S. GOVERNMENT
ACCOUNTABILITY OFFICE**

Ms. HECKER. Thank you, Mr. Chairman, I am very pleased to be here to speak on this important topic. As somebody has already said, the spectrum is really critical to our economy. At the same time, there is a rapid growth in demand, and concerns about scarcity, since most of the useable spectrum is already assigned. Similarly, there are concerns about underutilization, so we have done some work and have raised some concerns about whether the Federal framework that we have is really adequate to respond to the growing and future demand. We have in fact concluded that the need for attention to this matter is acute.

What I will cover is four topics and try to sweep through them pretty quickly. The first is the extent to which the FCC has adopted market-based mechanisms. Second, the extent to which government has adopted market mechanisms. Third, based on a review that we have done for this Committee, what some of the key options are for improving spectrum management. Finally, our summary of some of the institutional barriers that we believe there are to comprehensive spectrum reform.

The first issue about FCC: there is no doubt that FCC, with Congressional support, has moved forward incrementally to adopt market-based approaches. Clearly, and most importantly, is use of auctions. Also important are enhancing the use of secondary markets and introducing flexibility in certain bands. While auctions represent a substantial improvement, we would note that only a very small portion of total licenses, outstanding licenses, have actually been auctioned. Our analysis shows it is less than 2 percent of licenses.

On the allocation issue, we are concerned that basically FCC still employs largely a command-and-control process for the allocation of spectrum. And again, as I mentioned, while there is some flexibility in some bands, like CMRS, where the users are allowed to choose technology, have flexibility in their business models and services, that is not the case for most of the spectrum that is allocated. Concerns have been raised that the allocation process is slow and inefficient, leading to underutilization and not getting spectrum in the hands of the users who can make the most efficient and intense use of it.

Quickly then, to the governments use. Again, I think you have heard from Mr. Kneuer, there are clear initiatives on NTIA's part. But, it is certainly not comparable to what some other countries have done to truly adopt market-based mechanisms or proxies for market mechanisms and improving the incentives for efficient use by government users.

The current status quo, consistent with the limitations of Federal law, is that the fees that are imposed on government users are actually based on the number of assignments and are designed to spread the cost across the widest range of government users, and is not at all even a beginning proxy for the intensity of use of spectrum.

So, only 80 percent of the spectrum management cost of NTIA is recovered by the fees that are imposed on agencies. The premise is for some kind of incentive based fees and getting some transparency for the distribution and utilization in different government agencies; I think the inventory and first Federal plan that Mr. Kneuer talked about is definitely a first step forward. That is definitely a first step and we do acknowledge that there are definitely difficulties and challenges in applying market incentives, but we believe that the data show that there are substantial gaps and underutilization of spectrum by the government and improvements are definitely needed.

The two options that our work has identified to improve spectrum management are basically extending and refining auction authority, and reexamining the use and distribution of spectrum.

Obviously, the auction authority has been extended, but there is actually still some opportunity for some further refinements of auction authority. By Congress talking about better definition or clarity or flexibility in license rights, similar to your legislation allowing for unlicensed use of TV broadcast, white space as an example. Also, there are opportunities for further enhancement of secondary markets and further refinement of small business incentives.

The second major proposal put forward is basically that what we really need is a national spectrum census, and we are beginning to do that on a Federal level. We really do not have it on the commercial side. We need a broader evaluation of the tradeoffs between government and commercial use, licensed and unlicensed. Some steps are underway.

Our major concern, though, and this is really the bottom line is that there are fundamental institutional barriers to comprehensive reform of spectrum with a current government structure. While we have these two agencies, and each of them is talking about reform, neither has ultimate government decision-making authority or the authority to impose fundamental reform and that is why we really have a piecemeal approach in our view.

We have two outstanding recommendations. One is that the agencies really need to work together to have a complete national spectrum plan. The other recommendation is for potentially to have a commission like a base closing commission to be established by either Congress or the President that would do a comprehensive examination of current spectrum management and opportunities for reform.

In conclusion, the Congress has taken a vital first step with the extension of auction authority, but substantial work remains to be done and is vital to promote or perhaps even ensure the more efficient and effective use of this vital and national resource. Thank you, Mr. Chairman.

[The prepared statement of Ms. Hecker follows:]

PREPARED STATEMENT OF JAYETTA Z. HECKER, DIRECTOR, PHYSICAL INFRASTRUCTURE ISSUES, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. Chairman and Members of the Committee:

We appreciate the opportunity to provide testimony on spectrum reform issues. As you know, the radio-frequency spectrum is used to provide an array of wireless communications services that are critical to the U.S. economy and various government missions, such as national security. Demand for radio-frequency spectrum has exploded over the past several decades as new technologies and services have been—and continue to be—brought to the market in the private sector, and new mission needs unfold among government users. As a result, nearly all parties are becoming increasingly concerned about the availability of spectrum for future needs because most of the usable spectrum in the United States has already been allocated to existing services and users. Compounding this concern is evidence that some of the spectrum is currently underutilized. Many parties believe that spectrum management reform—such as greater reliance on market-based mechanisms that invoke the forces of demand and supply—is essential to meeting the growing and unpredictable demand for spectrum.

My statement today will identify (1) the extent to which the Federal Communications Commission (FCC) has adopted market-based mechanisms for commercial uses of spectrum,¹ (2) the extent to which market-based mechanisms have been adopted for Federal Government use of spectrum, (3) options for improving spectrum management, and (4) potential barriers to spectrum reform. My comments are based on our body of work on spectrum management, including our recently issued report to this Committee;² these reports were prepared in accordance with generally accepted government auditing standards.

In summary:

- FCC is incrementally adopting market-based approaches to managing the commercial use of spectrum. Market-based mechanisms can help promote the efficient use of spectrum by invoking the forces of supply and demand—that is, they provide users an incentive to use the spectrum as efficiently as possible. Examples of market-based mechanisms include introducing flexibility in the use of spectrum, using auctions to assign licenses, and enhancing the use of secondary markets as a means for companies to obtain access to spectrum. FCC has adopted these mechanisms for commercial uses. For example, although FCC currently employs largely a command-and-control process for spectrum allocation, it has provided greater flexibility within certain spectrum bands. In addition, FCC began using auctions to assign spectrum licenses for commercial uses in 1994. According to industry stakeholders, FCC's implementation of auctions is seen as an improvement over comparative hearings and lotteries, the primary assignment mechanisms employed in the past. Finally, FCC has taken steps to facilitate greater secondary market activity, which may provide an additional mechanism to promote the efficient use of spectrum.
- While some countries have adopted market-based mechanisms to encourage the efficient use of spectrum by government agencies, the Department of Commerce's National Telecommunications and Information Administration (NTIA) has not adopted similar mechanisms for Federal Government use in the United States. NTIA imposes fees that recover only a portion of its cost to administer spectrum management, rather than incentive-based fees—that is, fees that more closely resemble market prices and thus encourage greater spectrum efficiency among government users; currently, NTIA does not have authority to impose fees that exceed its spectrum management costs. However, adopting market-based mechanisms for Federal Government use of spectrum might be difficult or undesirable in some contexts because of the primacy of certain government missions, the lack of flexibility in use of spectrum for some agencies, and the lack of financial incentives for government users.
- As we reported in December 2005, industry stakeholders and experts have identified a number of options for improving spectrum management. The most fre-

quently cited options include (1) extending FCC's auction authority, (2) reexamining the use and distribution of spectrum, and (3) ensuring clearly defined rights and flexibility in commercially licensed spectrum bands; there was no consensus on these options, except for extending FCC's auction authority. Given the success of FCC's use of auctions and the overwhelming support for extending FCC's auction authority, we suggested that the Congress consider extending FCC's auction authority beyond the 2007 expiration date. Congress extended FCC's auction authority to 2011 with the passage of the Deficit Reduction Act of 2005.³

- The current management framework may pose barriers to reform since, while two agencies have been given responsibility for aspects of spectrum management, neither has been given ultimate decision-making authority over all spectrum use or the authority to impose fundamental reform, such as increasing the reliance on market-based mechanisms. Under this divided management framework, FCC manages spectrum for non-Federal users while NTIA manages spectrum for Federal Government users. However, spectrum management issues and major reform cross the jurisdictions of both agencies. To address these barriers, we have previously recommended that (1) the Secretary of Commerce and FCC establish and carry out formal, joint planning activities to develop a national spectrum plan to guide decision making; and (2) the relevant administrative agencies and congressional committees work together to develop and implement a plan for the establishment of a commission that would conduct a comprehensive examination of current spectrum management.⁴ To date, these recommendations have not been implemented.

Background

The radio-frequency spectrum is the part of the natural spectrum of electromagnetic radiation lying between the frequency limits of 9 kilohertz and 300 gigahertz.⁵ It is the medium that makes wireless communications possible and supports a vast array of commercial and governmental services. Commercial entities use spectrum to provide a variety of wireless services, including mobile voice and data, paging, broadcast radio and television, and satellite services. Additionally, some companies use spectrum for private tasks, such as communicating with remote vehicles. Federal, state, and local agencies also use spectrum to fulfill a variety of government missions. For example, state and local police departments, fire departments, and other emergency services agencies use spectrum to transmit and receive critical voice and data communications, and Federal agencies use spectrum for varied mission needs such as national defense, law enforcement, weather services, and aviation communication.

Spectrum is managed at the international and national levels. The International Telecommunication Union (ITU), a specialized agency of the United Nations, coordinates spectrum management decisions among nations. Spectrum management decisions generally require international coordination, since radio waves can cross national borders. Once spectrum management decisions are made at the ITU, regulators within each nation, to varying degrees, will follow the ITU decisions. In the United States, responsibility for spectrum management is divided between two agencies: FCC and NTIA. FCC manages spectrum use for non-Federal users, including commercial, private, and state and local government users under authority provided in the Communications Act. NTIA manages spectrum for Federal Government users and acts for the President with respect to spectrum management issues.⁶ FCC and NTIA, with direction from the Congress, jointly determine the amount of spectrum allocated to Federal and non-Federal users, including the amount allocated to shared use.

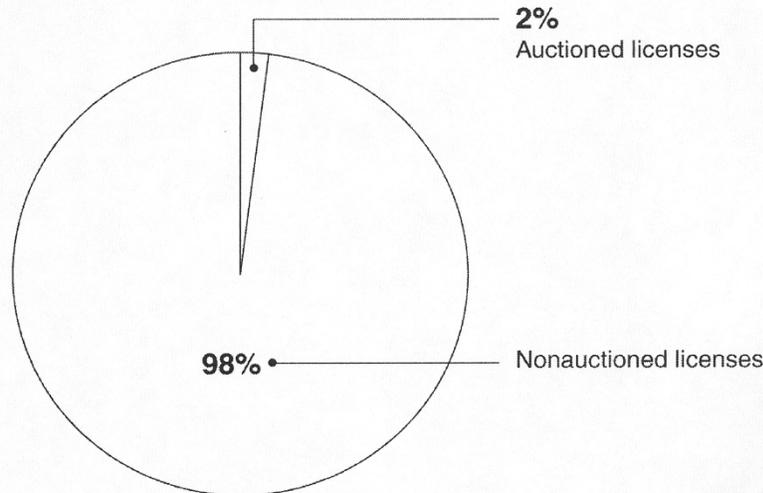
Historically, concern about interference or crowding among users has been a driving force in the management of spectrum.⁷ FCC and NTIA work to minimize interference through two primary spectrum management functions—the “allocation” and the “assignment” of radio spectrum. Specifically:

- *Allocation* involves segmenting the radio spectrum into bands of frequencies that are designated for use by particular types of radio services or classes of users. For example, the frequency bands between 88 and 108 megahertz (MHz) are allocated to FM radio broadcasting in the United States. In addition to allocation, FCC and NTIA also specify service rules, which include the technical and operating characteristics of equipment.
- *Assignment*, which occurs after spectrum has been allocated for particular types of services or classes of users, involves providing a license or authorization to use a specific portion of spectrum to users, such as commercial entities or government agencies. FCC assigns licenses for frequency bands to commercial en-

terprises, state and local governments, and other entities, while NTIA makes frequency assignments to Federal agencies.

When FCC assigns a portion of spectrum to a single entity, the license is considered exclusive. When two or more entities apply for the same exclusive license, FCC classifies these as mutually exclusive applications—that is, the grant of a license to one entity would preclude the grant to one or more other entities. For mutually exclusive applications, FCC has primarily used three assignment mechanisms—comparative hearings, lotteries, and auctions. FCC historically used comparative hearings, which gave competing applicants a quasi-judicial forum in which to argue why they should be awarded a license instead of other applicants. In 1981, partially in response to the administrative burden of the comparative hearing process, the Congress authorized the use of lotteries, which allowed FCC to randomly select licenses from the qualified applicant pool.⁸ The Congress provided FCC with authority to use auctions to assign mutually exclusive licenses for certain subscriber-based wireless services in the Omnibus Budget Reconciliation Act of 1993.⁹ Auctions are a market-based mechanism in which FCC assigns a license to the entity that submits the highest bid for specific bands of spectrum. As of November 30, 2005, FCC has conducted 59 auctions for over 56,000 licenses to select between competing applications for the same license, which have generated over \$14.5 billion for the U.S. Treasury. However, only a very small portion of total licenses has been auctioned. (See fig. 1.)

Figure 1: Percent of Licenses Auctioned



Source: GAO analysis of FCC data.

Notes:

To calculate the percentage of licenses that have been auctioned, we divided the number of auctioned licenses by the number of licenses included in FCC's three spectrum license databases.

Licenses can vary considerably in terms of bandwidth, as well as the geographic area and population covered.

In some frequency bands, FCC authorizes unlicensed use of spectrum—that is, users do not need to obtain a license to use the spectrum.¹⁰ Rather, an unlimited number of unlicensed users can share frequencies on a non-interference basis. Thus, the assignment process does not apply to the use of unlicensed devices. However, manufacturers of unlicensed equipment must receive authorization from FCC before operating or marketing an unlicensed device.

FCC Has Adopted Several Market-Based Mechanisms for Commercial Uses

To promote the more efficient use of spectrum, FCC is incrementally adopting market-based approaches to spectrum management. For instance, FCC has introduced some flexibility in the spectrum allocation process, although it remains large-

ly a command-and-control process. In addition, in 1994, FCC instituted auctions to assign certain spectrum licenses. According to industry stakeholders, FCC's use of auctions is seen as an improvement over comparative hearings and lotteries, the primary assignment mechanisms employed in the past. Finally, FCC has taken steps to facilitate greater secondary market activity, which may provide an additional mechanism to promote the more efficient use of spectrum.

FCC Has Introduced Some Flexibility in the Spectrum Allocation Process but Allocation Remains Largely a Command-and-Control Process

FCC currently employs largely a command-and-control process for spectrum allocation.¹¹ That is, FCC applies regulatory judgments to determine and limit what types of services—such as broadcast, satellite, or mobile radio—will be offered in different frequency bands by geographic area. In addition, for most frequency bands FCC allocates, the agency issues service rules to define the terms and conditions for spectrum use within the given bands. These rules typically specify eligibility standards as well as limitations on the services that relevant entities may offer and the technologies and power levels they may use. These decisions can constrain users' ability to offer services and equipment of their choosing.

However, FCC has provided greater operational and technical flexibility within certain frequency bands. For example, FCC's rules for Commercial Mobile Radio Service (CMRS), which include cellular and Personal Communications Services (PCS), are considered less restrictive. Under these rules, wireless telephony operators are free to select technologies, services, and business models of their choosing. FCC has not provided comparable flexibility in other bands.¹² For example, spectrum users have relatively little latitude for making similar choices in frequency bands allocated to broadcast television services.

Further, the Spectrum Policy Task Force Report, a document produced by FCC staff, identified two alternatives to the command-and-control model: the "exclusive, flexible rights" model, and the "open-access" model.¹³ The exclusive, flexible rights model provides licensees with exclusive, flexible use of the spectrum and transferable rights within defined geographic areas. This is a licensed-based approach to spectrum management that extends the existing allocation process by providing greater flexibility regarding the use of spectrum, and the ability to transfer licenses or to lease spectrum usage rights. The open-access model allows a potentially unlimited number of unlicensed users to share frequency bands, with usage rights governed by technical standards, but with no rights to interference protection. This approach does not require licenses, and as such is similar to FCC's Part 15 rules (which govern unlicensed use in the 900 MHz, 2.4 GHz, and 5.8 GHz bands)—where cordless phones and WiFi technologies operate. Both models allow flexible use of spectrum, so that users of spectrum, rather than FCC, play a larger role in determining how spectrum is ultimately used. FCC's Spectrum Policy Task Force recommended a balanced approach to allocation—utilizing aspects of the command-and-control; exclusive, flexible rights; and open-access models. FCC is currently using elements of these two alternatives models, although it primarily employs the command-and-control model.

FCC's Use of Auctions for Commercial Licenses Is Seen as an Improvement Over Past Assignment Mechanisms

In 1994, FCC began using auctions—a market-based mechanism that assigns a license to the entity that submits the highest bid for specific bands of spectrum. FCC's implementation of auctions mitigates a number of problems associated with comparative hearings and lotteries—the two primary assignment mechanism employed until 1993. For example:

- Auctions are a relatively quick assignment mechanism. With auctions, FCC reduced the average time for granting a license to less than 1 year from the initial application date, compared to an average time of over 18 months with comparative hearings.
- Auctions are administratively less costly than comparative hearings. Entities seeking a license can reduce expenditures for engineers and lawyers arising from preparing applications, litigating, and lobbying; and FCC can reduce expenditures associated with reviewing and analyzing applications.
- Auctions are a transparent process. FCC awards licenses to entities submitting the highest bid rather than relying on possibly vague criteria, as was done in comparative hearings.
- Auctions are effective in assigning licenses to entities that value them the most. Alternatively, with lotteries, FCC awarded licenses to randomly-selected entities.

- Auctions are an effective mechanism for the public to realize a portion of the value of a national resource used for commercial purposes. Entities submitting winning bids must remit the amount of their winning bid to the government, which represents a portion of the value that the bidder believes will arise from using the spectrum.

As we reported in December 2005, many industry stakeholders we contacted, and panelists on our expert panel, stated that auctions are more efficient than previous mechanisms used to assign spectrum licenses.¹⁴ For example, among our panelists, 11 of 17 reported that auctions provide the most efficient method of assigning licenses; no panelist reported that comparative hearings or lotteries provided the most efficient method. Of the remaining panelists, several suggested that the most efficient mechanism depended on the service that would be permitted with the spectrum.¹⁵

FCC Has Acted to Facilitate Secondary Market Transactions

While FCC's initial assignment mechanisms provide one means for companies to acquire licenses, companies can also acquire licenses or access to spectrum through secondary market transactions. Through secondary markets, companies can engage in transactions whereby a license or use of spectrum is transferred from one company to another. These transactions can incorporate the sale or trading of licenses. In some instances, companies acquire licenses through the purchase of an entire company, such as Cingular's purchase of AT&T Wireless. Ultimately, FCC must approve transactions that result in the transfer of licenses from one company to another.

Secondary markets can provide several benefits. First, secondary markets can promote more efficient use of spectrum. If existing licensees are not fully utilizing the spectrum, secondary markets provide a mechanism whereby these licensees can transfer use of the spectrum to other companies that would utilize the spectrum. Second, secondary markets can facilitate the participation of small businesses and introduction of new technologies. For example, a company might have a greater incentive to deploy new technologies that require less spectrum if the company can profitably transfer the unused portion of the spectrum to another company through the secondary market. Also, several stakeholders with whom we spoke noted that secondary markets provide a mechanism whereby a small business can acquire spectrum for a geographic area that best meets the needs of the company.

In recent years, FCC has undertaken actions to facilitate secondary-market transactions. FCC authorized spectrum leasing for most wireless radio licenses with exclusive rights and created two categories of spectrum leases: Spectrum Manager Leasing—where the licensee retains legal and working control of the spectrum—and de Facto Transfer Leasing—where the licensee retains legal control but the lessee assumes working control of the spectrum. FCC also streamlined the procedures that pertain to spectrum leasing. For instance, the Spectrum Manager Leases do not require prior FCC approval and de Facto Transfer Leases can receive immediate approval if the arrangement does not raise potential public interest concerns.¹⁶ While FCC has taken steps to facilitate secondary market transactions, some hindrances remain. For example, some industry stakeholders told us that the lack of flexibility in the use of spectrum can hinder secondary market transactions.

Market-Based Mechanisms Have Not Been Adopted for Federal Government Use of Spectrum

In some countries, spectrum managers have adopted market-based mechanisms to encourage the efficient use of spectrum by government agencies. In the United States, NTIA has not adopted incentive-based fees for Federal Government users of spectrum; rather, NTIA applies fees that recover only a portion of the cost of administering spectrum management. Additionally, adopting market-based mechanisms for government use of spectrum might be difficult or undesirable in some contexts because of the primacy of certain government missions, the lack of flexibility in use of spectrum for some agencies, and the lack of financial incentives for government users.

Incentive-Based Fees Have Not Been Used to Promote Spectrum Efficiency Among Federal Government Users of Spectrum in the United States

Spectrum managers in some countries have adopted market-based mechanisms for government users of spectrum. For example, in Australia, Canada, and the United Kingdom, spectrum managers have implemented incentive-based fees for government users of spectrum. Incentive-based fees are designed to promote the efficient use of spectrum by compelling spectrum users to recognize the value to society of the spectrum that they use. In other words, these fees mimic the functions of a

market. These incentive-based fees differ from other regulatory fees that are assessed only to recover the cost of the government's management of spectrum.

In the United States, NTIA has not adopted incentive-based fees, or other market-based mechanisms, for Federal Government users of spectrum. Currently, NTIA charges Federal agencies spectrum management fees, which are based on the number of assignments authorized to each agency. In our 2002 report, we noted that, according to NTIA, basing the fee on the number of assignments, rather than the amount of spectrum used per agency, better reflects the amount of work NTIA must do for each agency.¹⁷ Moreover, NTIA stated that this fee structure provides a wider distribution of costs to agencies. However, NTIA's fee does not reflect the value of the spectrum authorized to each agency, and thus it is not clear how much this encourages the efficient use of spectrum by Federal agencies. The fee also recovers only a portion of the cost of administering spectrum management. NTIA does not currently have the authority to impose fees on government users that exceed its spectrum management costs.¹⁸

Applying Market-Based Mechanisms to Federal Government Users May Not Be Effective in All Contexts

Applying market-based mechanisms might be difficult or undesirable for Federal Government users in some situations. The purpose of market-based mechanisms is to provide users with an incentive to use spectrum as efficiently as possible. However, the characteristics of government use of spectrum impose challenges to the development and implementation of market-based mechanisms for Federal Government users, and in some situations, make implementation undesirable. For example:

- *Primacy of certain Federal Government missions.* Because of the primacy of certain Federal Government missions—such as national defense, homeland security, and public safety—imposition of market-based mechanisms for use of the spectrum to fulfill these missions might not be desirable. In fact, NTIA officials have told us that the agency rarely revokes the spectrum authorization of another government agency because doing so could interfere with the agency's ability to carry out important missions.
- *Lack of flexibility in use of spectrum.* Market-based mechanisms can create an incentive to use spectrum more efficiently only if users can actually choose to undertake an alternative means of providing a service. In some situations, Federal Government agencies do not have a viable alternative to their current spectrum authorization. For example, spectrum used for air traffic control has been allocated internationally for the benefit of international air travel. Thus, the Federal Aviation Administration has little ability to use spectrum differently than prescribed in its current authorizations. In situations such as this, market-based mechanisms would likely prove ineffective.
- *Lack of financial incentives.* If Federal Government users can obtain any needed funding for spectrum-related fees through the budgetary process, market-based mechanisms are not likely to be effective. However, imposing fees will make the cost visible to agency managers, thus providing them information they need if they are to manage spectrum use more efficiently. Whether more efficient spectrum use actually occurs will depend in part on whether agencies receive appropriations for the full amount of the fees or only for some portion. If agencies do not receive appropriations for the full amount, some pressure will be created, but it will not be as strong as the private sector's profit motive.

Industry Stakeholders and Panelists Suggested Several Options to Improve Spectrum Management

As we reported in December 2005, industry stakeholders and panelists on our expert panel offered a number of options for improving spectrum management.¹⁹ The most frequently cited options include (1) extending FCC's auction authority, (2) re-examining the distribution of spectrum—such as between commercial and government use—to enhance the efficient and effective use of this important resource, and (3) ensuring clearly defined rights and flexibility in commercially licensed spectrum bands. There was no consensus on these options for improvements among stakeholders we interviewed and panelists on our expert panel, except for extending FCC's auction authority.

Extend FCC's Auction Authority

Panelists on our expert panel and industry stakeholders with whom we spoke overwhelmingly supported extending FCC's auction authority. For example, 21 of 22 panelists on our expert panel indicated that the Congress should extend FCC's auction authority beyond September 2007—the date auction authority was set to expire

at the time of our expert panel. Given the success of FCC's use of auctions and the overwhelming support among industry stakeholders and experts for extending FCC's auction authority, we suggested that the Congress consider extending FCC's auction authority. In February 2006, the Congress extended FCC's auction authority to 2011 with the passage of the Deficit Reduction Act of 2005.²⁰

While panelists on our expert panel overwhelmingly supported extending FCC's auction authority, a majority also suggested modifications to enhance the use of auctions.²¹ However, there was little consensus on the suggested modifications. The suggested modifications fall into the following three categories:

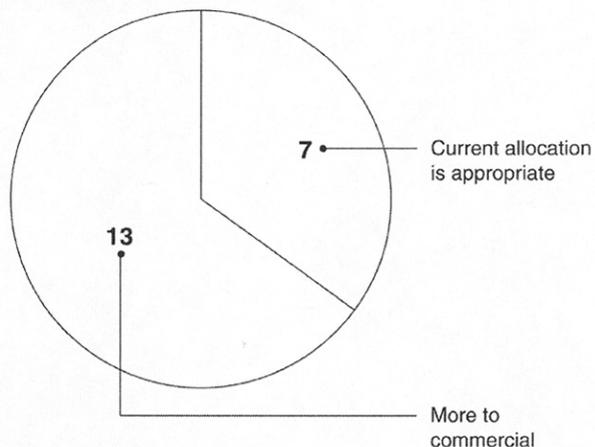
- *Better define license rights.* Some industry stakeholders and panelists indicated that FCC should better define the rights accompanying spectrum licenses, as these rights can significantly affect the value of a license being auctioned. For example, some industry stakeholders expressed concern with FCC assigning overlay and underlay rights to frequency bands when a company holds a license for the same frequency bands.²²
- *Enhance secondary markets.* Industry stakeholders we contacted and panelists on our expert panel generally believed that modifying the rules governing secondary markets could lead to more efficient use of spectrum. For example, some panelists on our expert panel said that FCC should increase its involvement in the secondary market. These panelists thought that increased oversight could help to both ensure transparency in the secondary market and also promote the use of the secondary market. Additionally, a few panelists said that adoption of a "two-sided" auction would support the efficient use of spectrum. With a two-sided auction, FCC would offer unassigned spectrum, and existing licensees could make available the spectrum usage rights they currently hold.
- *Reexamine existing small business incentives.* The opinions of panelists on our expert panel and industry stakeholders with whom we spoke varied greatly regarding the need for and success of FCC's efforts to promote economic opportunities for small businesses. For example, some panelists and industry stakeholders do not support incentive programs for small businesses. These panelists and industry stakeholders cited several reasons for not supporting these incentives, including (1) the wireless industry is not a small business industry; (2) while the policy may have been well intended, the current program is flawed; or (3) such incentives create inefficiencies in the market. Other industry stakeholders suggested alternative programs to support small businesses. These suggestions included (1) having licenses cover smaller geographic areas, (2) using auctions set aside exclusively for small and rural businesses, and (3) providing better lease options for small and rural businesses. Finally, some industry stakeholders with whom we spoke have benefited from the small business incentive programs, such as bidding credits,²³ and believe that these incentives have been an effective means to promote small business participation in wireless markets.

Reexamine the Use and Distribution of Spectrum

Panelists on our expert panel suggested a reexamination of the use and distribution of spectrum to ensure the most efficient and effective use of this important resource. One panelist noted that the government should have a good understanding of how much of the spectrum is being used. To gain a better understanding, a few panelists suggested that the government systematically track usage, perhaps through a "spectrum census." This information would allow the government to determine if some portions of spectrum were underutilized, and if so, to make appropriate allocation changes and adjustments.²⁴

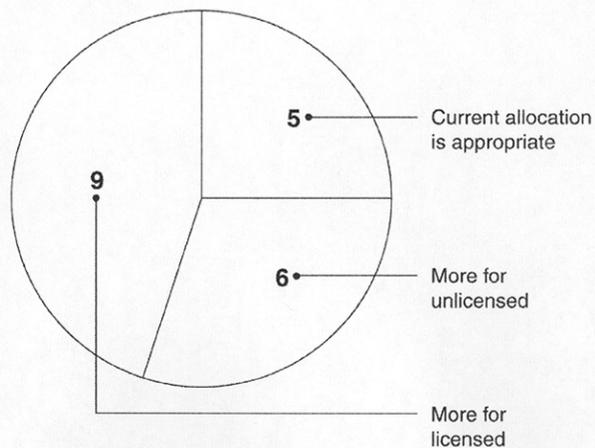
A number of panelists on our expert panel also suggested that the government evaluate the relative allocation of spectrum for government and commercial use as well as the allocation of spectrum for licensed and unlicensed purposes. While panelists thought the relative allocation between these categories should be examined, there was little consensus among the panelists on the appropriate allocation. For instance, as shown in figure 2, 13 panelists indicated that more spectrum should be dedicated to commercial use, while 7 thought the current distribution was appropriate; no panelists thought that more spectrum should be dedicated to government use. Similarly, as shown in figure 3, nine panelists believed that more spectrum should be dedicated to licensed uses, six believed more should be dedicated to unlicensed uses, and five thought the current balance was appropriate.

Figure 2: Panelists' Views on the Allocation of Spectrum between Commercial and Government Use



Source: GAO.

Figure 3: Panelists' Views on the Allocation of Spectrum between Licensed and Unlicensed Use



Source: GAO.

Ensure Clearly Defined Rights and Flexibility

Similar to a suggested modification of FCC's auction authority, some panelists on our expert panel suggested better defining users' rights and increasing flexibility in the allocation of spectrum. Better defining users' rights would clarify the understanding of the rights awarded with any type of license, whether the licensee acquired the license through an auction or other means. In addition, some panelists stated that greater flexibility in the type of technology used—and service offered—within frequency bands would help promote the efficient use of spectrum. In particular, greater flexibility would allow the licensee to determine the efficient and highly valued use, rather than relying on FCC-based allocation and service rules. However, some panelists on our expert panel and industry stakeholders with whom

we spoke noted that greater flexibility can lead to interference, as different licensees provide potentially incompatible services in close proximity.²⁵ Thus, panelists on our expert panel stressed the importance of balancing flexibility with interference protection.

The Current Framework for Spectrum Management May Pose Barriers to Reform

Under the current management framework, neither FCC nor NTIA has been given ultimate decision-making authority over all spectrum use or the authority to impose fundamental reform, such as increasing the reliance on market-based mechanisms. FCC manages spectrum for non-Federal users while NTIA manages spectrum for Federal Government users.²⁶ As such, FCC and NTIA have different perspectives on spectrum use. FCC tends to focus on maximizing public access to and use of the spectrum. Alternatively, NTIA tends to focus on protecting the Federal Government's use of the spectrum from harmful interference, especially in areas critical to national security and public safety. Further, despite increased communication between FCC and NTIA, the agencies' different jurisdictional responsibilities appear to result in piecemeal efforts that lack the coordination to facilitate major spectrum reform. For example, FCC's and NTIA's recent policy evaluations and initiatives—the FCC Spectrum Policy Task Force and the Federal Government Spectrum Task Force, respectively—tend to focus on the issues applicable to the users under their respective jurisdictions.²⁷

Major spectrum reform must ultimately address multidimensional stakeholder conflicts. One source of conflict relates to balancing the needs of government and private-sector spectrum users. Government users have said that because they offer unique and critical services, a dollar value cannot be placed on the government's provision of spectrum-based services. At the same time, private-sector users have stated that their access to spectrum is also critical to the welfare of society, through its contribution to a healthy and robust economy. A second source of conflict relates to balancing the needs of incumbent and new users of spectrum. Since most useable spectrum has been allocated and assigned, accommodating new users of spectrum can involve the relocation of incumbent users. While new users of spectrum view relocations as essential, incumbent users often oppose relocations because the moves may impose significant costs and disrupt their operations. A third source of conflict relates to existing technology and emerging technology. Some new technologies, such as ultra-wideband,²⁸ may use the spectrum more efficiently, thereby facilitating more intensive use of the spectrum. However, users of existing technology, both commercial and government, have expressed concern that these new technologies may create interference that compromises the quality of their services.

The current spectrum management framework may pose a barrier to spectrum reform because neither FCC nor NTIA has ultimate authority to impose fundamental reform and these stakeholder conflicts cross the jurisdictions of both FCC and NTIA. As such, contentious and protracted negotiations arise over spectrum management issues. We previously made two recommendations to help further the reform process. First, we recommended that the Secretary of Commerce and FCC should establish and carry out formal, joint planning activities to develop a national spectrum plan to guide decision-making.²⁹ Additionally, we also recommended that the relevant administrative agencies and congressional committees work together to develop and implement a plan for the establishment of an independent commission that would conduct a comprehensive examination of current spectrum management.³⁰ To date, neither recommendation has been implemented.

Concluding Observations

With authorization from Congress, FCC has taken several steps to implement a more market-oriented approach to spectrum management. In recent years, FCC has taken actions to facilitate secondary-market transactions. FCC authorized spectrum leasing for most wireless radio licenses with exclusive rights and also streamlined the procedures that pertain to spectrum leasing. In addition, FCC has conducted 59 auctions for a wide variety of spectrum uses, including personal communications services and broadcasting. FCC's auctions have contributed to a vibrant commercial wireless industry. The Congress' recent decision to extend FCC's auction authority was, in our opinion, a positive step forward in spectrum reform. However, more work is needed to ensure the efficient and effective use of this important national resource. To help reform spectrum management, we have previously recommended that (1) the Secretary of Commerce and FCC should establish and carry out formal, joint planning activities to develop a national spectrum plan to guide decision-making; and (2) the relevant administrative agencies and congressional committees work together to develop and implement a plan for the establishment of a commission

that would conduct a comprehensive examination of current spectrum management.³¹ To date, these recommendations have not been implemented.

Mr. Chairman, this concludes my prepared statement. I would be happy to respond to any questions you or other Members of the Committee may have at this time.

ENDNOTES

¹FCC manages spectrum use for non-Federal users, including commercial, private, and state and local government users.

²GAO, *Telecommunications: Strong Support for Extending FCC's Auction Authority Exists, but Little Agreement on Other Options to Improve Efficient Use of Spectrum*, GAO-06-236 (Washington, D.C.: Dec. 20, 2005); GAO, *Telecommunications: Comprehensive Review of U.S. Spectrum Management with Broad Stakeholder Involvement is Needed*, GAO-03-277 (Washington, D.C.: Jan. 31, 2003); and GAO, *Telecommunications: Better Coordination and Enhanced Accountability Needed to Improve Spectrum Management*, GAO-02-906 (Washington, D.C.: Sept. 30, 2002).

³Pub. L. No. 109-171, §3003, 120 Stat. 4 (2006).

⁴GAO-02-906 and GAO-03-277.

⁵Radio signals travel through space in the form of waves. These waves vary in length, and each wavelength is associated with a particular radio frequency. Radio frequencies are grouped into bands and are measured in units of Hertz. The term kilohertz refers to thousands of Hertz, megahertz (MHz) to millions of Hertz, and gigahertz to billions of Hertz.

⁶The Department of State also plays a role in spectrum management by coordinating and mediating the U.S. position and leading the Nation's delegation to international conferences on spectrum management.

⁷Interference occurs when two or more radio signals interact in a manner that disrupts the transmission and reception of messages.

⁸In 1981, Congress added Section 309(i) to the Communications Act to give FCC the authority to assign a broad range of licenses by lottery. The Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 260, tit. III, §3002, terminated FCC's authority to assign licenses by lotteries, except with respect to licenses for non-commercial broadcast stations and public broadcast stations. See, 47 U.S.C. §309(i)(5) and 47 U.S.C. §397(6).

⁹47 U.S.C. §309(j). In subsequent years, the Congress has modified and extended FCC's auction authority, including exempting some licenses from competitive bidding, such as licenses for public safety radio services and noncommercial educational broadcast services.

¹⁰Traditional unlicensed devices are low-powered equipment that operate in a limited geographic range, such as cordless phones, baby monitors, garage door openers, and wireless access to the Internet.

¹¹NTIA employs a similar process for Federal Government spectrum users.

¹²In some instances, statutory restrictions are an impediment to granting greater flexibility.

¹³For more information on these alternative spectrum management models, including the perceived advantages and disadvantages of each, see GAO-06-236.

¹⁴See GAO-06-236. We convened, in collaboration with the National Academies, two panels of experts to discuss spectrum allocation and assignment issues and options to improve spectrum management. The panelists convened at the National Academies on August 9, 2005, and August 10, 2005. A total of 23 panelists participated on our two expert panels. For more information on the expert panels, see GAO-06-236.

¹⁵For example, some panelists did not support using auctions to assign spectrum licenses for public safety services.

¹⁶The public interest concerns arise as a result of FCC policies pertaining to (1) eligibility and use of the license and spectrum, (2) foreign ownership limitations, (3) designated entity and entrepreneur benefits, and (4) competition. See *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd. 17503 (2004).

¹⁷GAO-02-906.

¹⁸In its 2005 program assessment of NTIA, OMB noted that NTIA does not currently have sufficient mechanisms in place to ensure efficient and effective Federal spectrum use. OMB further notes that NTIA lacks the authority to implement market-based or other incentives to promote efficient and effective use of the Federal spectrum among Federal agencies. According to OMB, NTIA plans to study incen-

tives to promote the more efficient and effective use of spectrum and seek authority to implement incentives, as appropriate.

¹⁹ GAO-06-236.

²⁰ Pub. L. No. 109-171.

²¹ Fifteen of twenty-two panelists suggested modifications to enhance the use of auctions.

²² Underlay rights allow unlicensed users to operate in the same spectrum bands as licensees, as long as the unlicensed users do not cause undue interference for licensees. For example, ultra-wideband technology operates at very low power levels over a very wide range of spectrum, and thus might avoid interfering with licensed spectrum users in the same spectrum bands. Overlay rights allow unlicensed users to operate in licensed spectrum bands during times or in geographic areas where licensees are not using the spectrum.

²³ A bidding credit is a percentage discount applied to the high bid amount if the bidder meets designated entity criteria established in the auction rules. In February 2006, FCC issued a notice of proposed rulemaking to consider whether its general competitive bidding rules should be modified.

²⁴ In February 2006, the Technology CEO Council released a report entitled, *Freeing Our Unused Spectrum: Toward a 21st Century Telecom Policy* (Washington, D.C.: Feb. 2006). This report included recommendations for FCC and NTIA to examine how efficiently spectrum bands are being used and encourage more efficient use of bands that are not found to be used efficiently.

²⁵ With the current allocation process, FCC attempts to keep incompatible service separated to avoid interference. With licensees exerting greater control, this protection could be reduced.

²⁶ In some countries, a single government entity regulates spectrum for all users. For example, Industry Canada has exclusive spectrum management responsibility in Canada.

²⁷ At a recent NTIA-sponsored workshop addressing spectrum management, the topics discussed included issues relevant for both FCC and NTIA, and the participants included spectrum managers from several government agencies, as well as FCC officials, commercial users, and other experts.

²⁸ Ultra-wideband devices emit a low-power signal over large swaths of spectrum.

²⁹ GAO-02-906.

³⁰ GAO-03-277.

³¹ GAO-02-906 and GAO-03-277.

The CHAIRMAN. Thank you very much. Let me call for the attention of the Members. We have six other witnesses after this panel. So, it is my hope we will keep our questions brief.

**STATEMENT OF HON. TRENT LOTT,
U.S. SENATOR FROM MISSISSIPPI**

Senator LOTT. Mr. Chairman, may I suggest, could we skip the questions and statements at this time and go to the next panel because I am really interested in hearing what they have to say.

The CHAIRMAN. I would prefer to do that if these witnesses would not mind waiting to answer their questions until after the others have spoken. Will you be able to stay? Is that an inconvenience? I know it is an inconvenience, but can you do it?

Ms. SEIDEL. Yes.

Mr. KNEUER. Yes.

The CHAIRMAN. Without objection, then we will ask the next panel to come up and make their statements and then we will ask questions of all of these nine witnesses, after that time. The next panel is Thomas Walsh, General Manager of the Illinois Valley Cellular Company, and President of the Board of the Rural Cellular Association. Kevin Kahn, Director of the Communications Technology Lab of Intel Corporation. Robert Hubbard, Secretary Treasurer of the Association of Maximum Service Television and President and Chief Executive Officer of Hubbard Television Group.

Thomas Sugrue, Vice President, Government Affairs at T-Mobile USA. Jeannine Kenney, Senior Policy Advisor for the Consumers Union. And Lawrence White, the Co-Chair of the Spectrum Policy Working Group. We will proceed in that order if that is agreeable, and we do hope that you also will cooperate with us by keeping your statements to under 5 minutes. The first witness is Thomas Walsh, General Manager, Illinois Valley Cellular, President of the Board, Rural Cellular Association.

**STATEMENT OF THOMAS F. WALSH, GENERAL MANAGER,
ILLINOIS VALLEY CELLULAR; PRESIDENT OF THE BOARD,
RURAL CELLULAR ASSOCIATION**

Mr. WALSH. Good morning. I am Tom Walsh. I am General Manager of Illinois Valley Cellular. Our company has 50,000 subscribers in North Central Illinois. We have been in business for 16 years. I have my wife and my son here at the hearing this morning. I am kind of proud of that. I am also President of the Rural Cellular Association. The Rural Cellular Association represents the interests of nearly 100 small and rural carriers throughout the United States. Wireless companies providing wireless telecommunications services to approximately 14.6 million people in more than 135 rural and small markets.

Sincere thanks to the Chairman and Committee Members for the opportunity to present RCA's views on spectrum policy. RCA members know firsthand that expanding the options for rural carriers to purchase spectrum will increase the availability of competitive broadband services beyond the urban areas. Providing opportunities for small and rural carriers to compete for spectrum will also deliver increased economic development and improved 911 and E-911 emergency response services, especially in rural communities that lack those services today.

As Congress considers spectrum reform, RCA asks that Members not lose sight of the core challenges faced by smaller carriers who have the responsibility to offer rural residents and businesses the same services and choices that are available to the public in urban areas. Those challenges include, the inability of small carriers to compete effectively for licenses auctioned by large geographic areas.

Second, FCC policies that allow inefficient use of spectrum. We are disappointed to see "wasted" spectrum where licensees of large areas do not construct facilities to serve all of their market areas.

Third, FCC's procedures that would hide the identity of bidders during spectrum auctions and in some auctions provide for "closed" bidding on certain licenses.

RCA believes rural areas are best served by policies that increase smaller carrier access to spectrum. Small carriers are at a disadvantage during FCC spectrum auctions, whenever licenses combine both rural and urban areas. When rural counties are grouped in licensed areas with urban areas, as is the case with the Basic Trading Areas (BTAs), Economic Areas (EAs), and the largest geographic license areas known as Economic Area Groupings (EAGs). The auction prices can be expected to soar beyond the means of most small carriers. However by separating the rural counties from urban licensed areas through the use of small cellular market areas, such as Rural Service Areas (RSAs) and Metropolitan Serv-

ice Areas (MSAs), companies of all sizes can participate in the auction. Each participant can focus attention on the licenses that best conform to their individual service plans. Use of the RSAs and MSAs as license areas allow all bidders to mix and match rural and urban areas, according to their individual business plans and financial capabilities.

My second point today is that spectrum policy should encourage spectrum use by those who purchase the licenses. Frequently, large license areas lead to spectrum lying unused. The FCC addressed this problem in the context of cellular service and required all cellular companies 5 years after obtaining a license to file maps showing where the service was provided and where more importantly not provided within their licensed area. The FCC then allowed interested companies to file applications for the unserved areas of a minimum size announced by the FCC, and if there were multiple applicants, auction off the available areas to the highest bidder. Congress should require the FCC to use a similar unserved area licensing process for PCS and other radio services. This would allow companies willing to use this spectrum to obtain licenses and provide service.

My third and final point is that spectrum policy should promote participation in auctions by smaller rural carriers because rural area build-outs lead to improved 911 and E-911 emergency response services, and economic development in rural areas. Many rural communities are lacking 911 services today. To allow more emergency calls to be completed and to help first responders locate and assist persons in distress, Congress should take into consideration the special needs of rural carriers as they prepare for upcoming spectrum auctions.

Small and rural carriers are also a significant contributor to economic development in rural areas. The availability of advanced wireless services in rural areas provides jobs, and encourages business expansion. There is no better way to add to the economic base of a rural market than to have an infrastructure in place that allows businesses to move to the rural market and have essentially the same wireless communications available that exist in urban areas.

RCA is concerned about an FCC proposal that would result in "blind bidding" during auctions. That change would create problems for small and rural carriers because they depend on roaming agreements with large carriers in order to serve customers who travel outside of rural markets. Small carriers can pay more for licenses—if they have confidence that roaming partners with compatible networks are bidding actively in urban areas that are nearby the rural markets of their interest.

Finally, RCA believes spectrum policy should not include use of "closed bidding" for certain licenses. These set-asides are problematic because there has been extensive use of shell companies by large wireless carriers to avoid attribution of large carriers gross revenue to the applicants. The FCC is working now to end that tactic and RCA encourages the FCC in that regard. But if licenses are no longer set aside for closed bidding there would be less incentive for large companies to find ways around the rules.

In conclusion, technology and innovation has created an exciting new world in telecommunications. Few people imagine that the demand for advanced wireless services in rural areas of the country would be as compelling as it is today. A fresh review of how spectrum should be auctioned in terms of market size and auction procedures is much needed. It is RCA's hope that to ensure greater availability and the expansion of quality telecommunications services in rural areas, Congress will take our observations into consideration in any spectrum reform effort. Thank you for your time and attention to this important matter. I will be available for questions.

[The prepared statement of Mr. Walsh follows:]

PREPARED STATEMENT OF THOMAS F. WALSH, GENERAL MANAGER, ILLINOIS VALLEY CELLULAR; PRESIDENT OF THE BOARD, RURAL CELLULAR ASSOCIATION

I. Introduction

I am Tom Walsh, General Manager of Illinois Valley Cellular. Our company has provided wireless service for over sixteen years to small rural towns in north central Illinois such as Ottawa and La Salle-Peru. I am also President of the Board of Rural Cellular Association (RCA), the trade association for approximately 100 of the Nation's smallest rural wireless providers. RCA is pleased to offer the Committee its views on spectrum policy.

Rural Cellular Association represents the interests of nearly 100 small and rural wireless licensees providing wireless telecommunications services to approximately 14.6 million people in more than 135 rural and small metropolitan markets. RCA members historically have led the industry in making the investments required to offer wireless services in the most rural areas of the country.

RCA believes that high quality wireless service is the key to allowing customers in rural areas to gain full access to broadband and other advanced telecommunications services. To achieve that goal the Federal Communications Commission (FCC) must adopt auction plans that allow equitable participation in rural areas by the small businesses that serve rural Americans. Because RCA members live, work and play in the rural communities we serve, we know first hand that expanding options for rural carriers to purchase spectrum will increase rural access to advanced telecommunications services and accelerate the availability of competitive broadband services beyond metropolitan areas. Providing opportunities for small and rural carriers to compete for spectrum will also deliver increased economic development and improved 911 and E-911 emergency response services, especially in rural communities that lack those services today. Policies that encourage rural carriers' participation in spectrum auctions open the door to rural consumers having the health, safety, and economic development opportunities that are critical to bridge the technology gap between urban and rural America.

RCA asks that Congress not lose sight of challenges faced by smaller entities that have a sincere desire to offer rural residents and businesses the same services and choices that are available to the public in metropolitan areas. Those challenges are:

- (1) Inability of small entities to compete effectively for licenses auctioned for geographic areas larger than MSA/RSA;
- (2) FCC policies that allow inefficient use of spectrum. We are disappointed to see "wasted" spectrum where licensees of large areas do not construct facilities to serve all of their market areas; and
- (3) FCC procedures that would hide the identity of bidders during spectrum auctions and in some auctions provide for "closed" bidding on certain licenses.

II. Smaller License Areas Would Open Opportunities to Small Businesses and Expedite Competitive Wireless Broadband Services to Rural Areas

As to the first problem I identified, small carriers desiring to provide broadband and other wireless services in rural areas typically cannot afford to compete at auction for licenses that have service areas that combine rural and major metropolitan areas. For this reason, RCA believes the most effective means to foster the prompt availability of competitive wireless services to rural markets is to make available more licenses in any spectrum auction with service areas no larger than Cellular Market Areas (CMAs) which are the Rural Service Areas (RSAs) and Metropolitan Service Areas (MSAs) that were used by the FCC for licensing cellular systems. Unfortunately, when rural counties are grouped in license areas with metropolitan

areas, as is the case with Basic Trading Areas (BTAs), Economic Areas (EAs) or the largest geographic license areas known as Economic Area Groupings (EAGs), the auction prices for licenses can be expected to soar beyond the means of most small entities, at least those that are not owned in part by large companies. Large-companies have a built-in advantage in the auction system because their purchasing clout can edge out smaller entities attempting to acquire spectrum. Furthermore, wireless service history shows that large entities that acquire licenses for large geographic areas do not make a priority of bringing the benefits of the latest wireless technologies to the rural portions of their license areas. In sharp contrast, RCA members historically have built and continue to build out their license areas even in the most rural of areas. In fact the small rural carrier is often the sole provider of wireless services in rural towns away from major highways. Partitioning, disaggregation and spectrum leasing do not provide the best solutions because specifications for service are typically dictated by the large company license holder. The effect of excessively large or inefficiently sized geographic license areas is a lost opportunity to allow spectrum to reach an entity that would make best use of it.

However by separating the rural counties from metropolitan license areas, by the use of CMAs with RSA/MSA boundaries, entities of all sizes can participate in the auctions and each participant can focus attention on the licenses that best conform to their individual service plans. Use of RSAs and MSAs as license areas is the proper balance in market size and allows all bidders to mix and match rural and urban areas according to their individual business plans and financial capabilities. The availability of RSA licenses, which by definition encompass only counties that are outside of all MSAs, is especially important to small wireless carriers, and it does not disadvantage the large carriers because they can make an independent choice of whether to pursue licenses for rural markets in addition to metropolitan markets.

III. Improving Access To and Use of Spectrum in Rural Areas

The second problem I wish to bring to your attention involves “wasted” license rights as the result of unused spectrum in rural areas. The FCC’s current policies allow inefficient use of spectrum. Rural consumers are best served by the creation of small license areas that encourage more efficient use of spectrum. Spectrum reform should not allow licensees to retain rights to spectrum in areas where facilities are not constructed after a reasonable period of time. The FCC recognized this problem years ago in the context of cellular service and required all licensees, five years after obtaining a license, to file maps that showed where service was provided and where markets were unserved. This allowed interested companies to file applications for unserved area of a minimum size announced by the FCC. If multiple applications are received the FCC can conduct an auction of the available area, and re-license the area to the highest bidder.

RCA supports adoption of a “substantial service” alternative construction requirement for all wireless services that are licensed on a geographic area basis. Geographic area and population-based criteria would be available to show “substantial service” to an area.

Rural markets are best served by spectrum policies that require carriers to “use it or lose it,” thereby providing an incentive for carriers to build out the rural areas for the present and potential customers and revenues they offer. Spectrum reform policy should not impose a draconian license forfeiture penalty where a market is not totally constructed, rather only the portion of the market not constructed should be subject to the unserved area re-licensing process.

IV. Spectrum Policies that Promote Construction in Rural Areas Lead to Enhanced Public Safety and to Rural Area Economic Development

Spectrum policies that promote participation in auctions by small and rural carriers will lead to improved 911 and E-911 emergency response services as facilities are constructed in the rural areas. Many rural communities lack E-911 services today. To allow more emergency calls to be completed and to help first responders locate and assist persons in distress, Congress should take into consideration the special needs of rural carriers as they prepare for upcoming spectrum auctions.

Small and rural carriers are also a significant contributor to economic development in rural areas. They employ people in rural areas but perhaps more importantly, the availability of advanced wireless services in rural areas encourages business expansion in rural areas. There is no better way to add to the economic base of a rural market than to have infrastructure in place that allows businesses to move to the rural market and have essentially the same wireless communications available as exist in metropolitan areas.

Encouraging small carrier participation in auctions is largely within the control of Congress and the FCC. In addition to small geographic license areas the auction procedures should be designed so as not to favor large entities over small entities. RCA is concerned about a proposal by the FCC to alter auction procedures for the upcoming auction of Advanced Wireless Services spectrum. That proposal would shield the identity of bidders from other bidders during the course of the auction. A "blind bidding" process would deter participation by RCA members who want to know, round by round in the bidding, what other entities are bidding for the same licenses, and for licenses in the region that surrounds a market of interest. This is a problem because small wireless carriers depend upon roaming agreements with larger carriers in order to allow customers to continue to have wireless service available when they travel beyond the rural carriers' markets. In a blind bidding scenario RCA members would not know if they should bid on licenses because they would lack confidence that their networks would be compatible with the networks of bidders for surrounding markets in the region.

Lastly, RCA urges Congress to avoid policies that create "set asides" or closed auctions as a way to encourage small carrier participation in auctions. Because of the realities of the telecommunications market place, set asides discourage participation in auctions and lower auction revenues by disqualifying a meaningful number of rural carriers because their own gross revenues exceed a threshold stipulated by the FCC. The FCC rule stipulates that a spectrum purchaser must not exceed revenues of \$125 million in each of the last two years. The FCC's attribution rules cause the gross revenues of owners of applicants to be counted, often disqualifying them from eligibility. To circumvent that rule there has been extensive use of "shell companies" by large wireless carriers to avoid attribution of large carriers' gross revenues to the applicant. The FCC is working now to end that tactic, and RCA encourages the FCC in that regard. But if licenses are no longer set aside for closed bidding there would also be less incentive for large companies to find ways around the rules. Bid credits remain a useful tool to promote small business participation in auctions, and RCA asks that any legislation in this area require the FCC to continue to make use of bid credits in future auctions.

V. Conclusion

In conclusion, technology and innovation have created an exciting new world in telecommunications where no one could imagine that the demand for such services in rural areas of the country would be as compelling as it is today. A fresh review of how spectrum should be auctioned, in terms of market size and auction procedures, is much needed. To ensure greater availability and the expansion of quality telecommunications services in rural areas, Congress should:

- 1) Ensure that spectrum made available by the FCC through auctions is offered according to geographic license areas, specifically Cellular Market Areas comprised of MSAs and RSAs, which are small enough to encourage participation by small businesses. MSA/RSA licensing plans will encourage expansion of wireless facilities in rural areas which will accelerate rural broadband deployment which, in turn, will promote public safety, educational opportunities and economic development in rural areas;
- 2) Require the FCC, to extend the "unserved area licensing" process to PCS and other radio services to allow entities willing to use spectrum where current licensees have not constructed facilities to apply for and obtain licenses for unserved areas; and
- 3) Promote spectrum auction procedures that encourage small and rural carrier participation in auctions. The FCC's proposed use of "blind bidding" in auctions should not be permitted to occur, nor should licenses in future auctions be set aside for small entities because that practice encourages circumvention of rules by large companies.

Chairman The next witness is Kevin Kahn, Director of the Communications Technology Lab of Intel Corporation.

STATEMENT OF KEVIN C. KAHN, SENIOR FELLOW AND DIRECTOR, COMMUNICATIONS TECHNOLOGY LAB, INTEL CORPORATION

Mr. KAHN. Thank you, Mr. Chairman, Members of the Committee. I am a Senior Fellow with Intel Corporation. I am the Director of our Communications Technology Laboratory, which is a

worldwide research and advanced development lab, obviously, involved in communications topics of all sorts. I have been at Intel nearly 30 years, and in that time, I have been heavily involved in the development in our communications policies and our technology positions relative to those. I am honored to be here today, invited to discuss some of these complex issues with you. Clearly, the increasing use of spectrum we are seeing today is creating an increasing pressure to use that spectrum well.

Spectrum is an artificially scarce resource, heavily allocated, but often not really used all that efficiently or well, if you look at the deployment of real equipment. When the only users of spectrum really were radio/television and the government for the most part, perhaps this kind of inefficiency was tolerable. Certainly, the pressure to do better wasn't there. However, today with the explosion of cellular use, mobile e-mail, WiFi, broadband access, and innumerable new applications for consumers, this efficiency must be increased. And in that regard, Intel commends Chairman Stevens and Senators Allen, Sununu, Kerry, Boxer and Dorgan for sponsoring the "American Broadband for Communities Act" and the "Wireless Innovation Act of 2006," respectively. And we also applaud Senator Smith's support of the "white spaces" legislation.

Now in my written testimony I point you to the Technology CEO Council recommendations, which set a broad agenda for spectrum reform, including such things as more flexible license spectrum, greater use of unlicensed spectrum and a general movement toward capitalizing on modern technologies. But in the rest of these comments, I really want to focus on the so-called TV "white spaces" issue. I would like to make three points.

First, there really is a public benefit to be had by moving to broader controlled use of the TV bands. Second, there is spectrum available to do this throughout the United States to allow new uses of the resource. And third and most importantly, it is technologically feasible without impact to TV services to get much more efficient use of these bands by allowing the use of the "white spaces." We have filed extensive, technical comments from Intel with the FCC in response to its proceeding in this matter and those are all available as well for reference.

To the first point, there is actually a benefit to be had by doing this. I think you have already heard reference to the importance of rural broadband services and these are difficult to provision using wired solutions. On the other hand, wireless can open up broadband services to low-density populations and do it cost effectively. The TV spectrum represents excellent frequencies for this application due to its propagation characteristics. We estimate anywhere from 3 to 4 times fewer base stations, and that makes a huge difference in the costs associated with deploying such a service and therefore the attractiveness of actually getting that service out to the American populace.

As far as low power uses of the bands are concerned, there are a lot of cutting edge consumer applications that can be made available with low power radios within the home. The signal reliability range within the house of those same frequencies is quite attractive for that. And finally, this is a class of reform that I think we will

need to see much more of as we try to move toward a modern regime of spectrum allocation and management.

Second, the spectrum really is available throughout the United States. We have done very conservative studies, even in congested areas, that show that there is significant “white space” available for low power applications. Even in places like New York City or Los Angeles, one finds 20 to 30 MHz in the worst situations. When you get to even somewhat less dense population areas, such as a place like Salt Lake City, you will find 90 MHz available. In the rural areas, of course, much, much more spectrum becomes available for things like broadband access.

Finally, I would like to point out that really this is technologically feasible. High power broadband access applications really can be handled very well by siting restrictions. We have very good geo-location capabilities and it is certainly possible to identify what frequency bands are available in rural areas and then make them available for use for broadband access with no danger to any of the TV channels. Low power applications could certainly be handled through sensing of the spectrum. Contrary to some of the other comments filed in the FCC proceeding, sensing is in use today successfully in a number of places. This is not an unproven or untried technology. In fact, the experience in the 5 GHz band with the Department of Defense required that industry be able to sense something far more difficult to detect than a television station. Namely radar systems that were specifically designed not to be detected and yet agreements were reached on how to do that demonstrably between the Department of Defense, a very difficult customer, and the industry. So, I think there is certainly evidence that this is not technologically undoable.

So, finally, I would like to summarize by pointing out that this combination of public value, the fact that the spectrum exists and is inefficiently utilized today and the fact that we now have the technology to take advantage of it, really come together and make it an important time to act on revising the way in which we handle the spectrum. We certainly, strongly encourage both the FCC and the Congress to move ahead on this important topic. Certainly, Intel stands ready to assist in answering any relevant questions that we can help with as we go forward.

I thank you for your time this morning.

[The prepared statement of Mr. Kahn follows:]

PREPARED STATEMENT OF KEVIN C. KAHN, SENIOR FELLOW AND DIRECTOR,
COMMUNICATIONS TECHNOLOGY LABORATORY, INTEL CORPORATION

I. Introduction

I am Kevin Kahn, Intel Senior Fellow and Director of Intel’s Communications Technology Laboratory. In my current position, I manage a research and development lab that explores future technologies in optics as well as wired and wireless communications. During my 29 years at Intel, I have worked in a variety of areas including software design, processor and systems architecture, and data communications. Intel Fellows, our company’s highest technical position, provide strategic technical guidance to the company. Therefore, I have been deeply involved in the development of Intel’s technology policy positions in broadband and wireless communications. I have also served on advisory committees and panels at the Federal Communications Commission, the National Science Foundation, and the National Academy of Sciences.

It is an honor to appear before this Committee to testify on wireless issues and spectrum management reform, including the deployment of unlicensed wireless services.

II. Need for Spectrum Reform

All wireless technologies require radio spectrum. And, as innovative technologies are developed by companies like Intel, their success in the marketplace ultimately depends upon appropriate and sufficient radio spectrum being made available by government regulations. Thus, as demand grows for an established standard, such as WiFi (IEEE 802.11), or as new standards based around new technology are readied for the marketplace, such as WiMAX (IEEE 802.16), regulations need to change to allow their use and broad acceptance. Standards provide international interoperability and the opportunity to achieve economies of scale and scope, but none of this is possible without the necessary spectrum.

Unfortunately, traditional means of spectrum management are inefficient and have resulted in large portions of our radio spectrum being allocated to specific technologies and services. The result is that today there is not sufficient room for new usage.

A. Artificial Scarcity

Indeed, spectrum is artificially scarce because under the current regulatory structure—which is primarily based on an outdated system of “command and control” spectrum management—much of our radio spectrum is locked into old uses and old technologies. More importantly, this antiquated spectrum management regime locks out new uses and technologies. As a consequence, available spectrum for new wireless technologies is artificially scarce and very expensive—a problem, which in recent years, has only become more severe.

The FCC, NTIA, and Congress are to be commended for their efforts at spectrum management reform to date including authorization of innovative technologies such as UWB, software defined radios, and cognitive radios; making more radio spectrum available for wireless technologies such as WiMAX, 3G, and WiFi at 2 GHz, 5 GHz, and 70/80/90 GHz; and efforts to free up critical spectrum below 1GHz via the DTV legislation and the proposed TV “white spaces” rules and legislation.

These efforts recognize that, as innovation continuously advances, so must our approach to radio spectrum. Indeed, our national policy needs to advance so as not to suppress market forces. As the Technology CEO Council (or TCC)—the information technology industry’s public policy advocacy organization comprising CEOs from Applied Materials, Dell, EMC, Hewlett-Packard, IBM, Intel, Motorola, NCR, and Unisys—states in its February 2006 paper “Freeing Our Unused Spectrum: Toward a 21st Century Telecom Policy”:

How we address and manage spectrum scarcity is one of the most important public policy challenges our country faces as we move deeper into the 21st century. Efficient spectrum policy can drive technological innovation and productivity and, thus, our entire economy. Indeed, if our Nation manages its spectrum resources well, it will have a competitive advantage in the global market that will benefit all our citizens . . .”¹

B. Spectrum Reforms

For these reasons, Intel supports policies that maximize spectrum efficiency and reduce artificial spectrum scarcity. Widespread adoption of market-based spectrum policies will allow carriers and manufacturers to make market-driven deals to deploy WiMAX and other efficient new technologies.

1. TCC Recommendations

To this end, Intel believes that the solution to the current lack of spectrum for wireless and other technologies lies in the adoption of certain fundamental reforms—many of which are set forth in the TCC paper as “recommendations” for maximizing our Nation’s spectrum efficiency and wireless potential. Among the TCC recommendations are the following:

- (i) Undertake spectrum inventories to identify inefficient spectrum use. And then transfer underutilized Federal Government spectrum to commercial use or sharing such spectrum with commercial users.

¹Technology CEO Council, “Freeing Our Unused Spectrum: Toward a 21st Century Telecom Policy,” Feb. 2006, at 2 (available online at <http://www.techceocouncil.org/index.php?option=content&task=view&id=248> (TCC Paper)). The information referred to has also been retained in Committee files.

(ii) Allow more flexibility within licensed use. (Licensed use refers to technology, such as TV and cellular, for which users must have an FCC license before using the spectrum to transmit a signal.) Licensed use is preferable in congested areas to assure quality of service and promote investment. Enabling flexible licenses that permit assignment, lease, or transfer of spectrum rights, as well as negotiation of interference rights, leads to increased innovation and spectrum efficiency.

(iii) Give the FCC explicit authority to use certain market-based auction mechanisms, and reform the FCC's auction procedures. The FCC should be encouraged to use combinatorial or package bidding to facilitate optimal combinations of spectrum rights. The FCC also should consider whether market-based mechanisms, such as "two-sided auctions" and the use of "auction vouchers,"² could be adopted to encourage more efficient spectrum use. These mechanisms encourage users to transfer underutilized spectrum to those who can provide more valuable services.

(iv) Allow more unlicensed use in rural areas and where otherwise appropriate. (Unlicensed use refers to technology, such as WiFi radios, for which manufacturers must have their devices certified by the FCC before deploying, but do not require users to have a license to use the spectrum.) As we have seen with WiFi, permitting more unlicensed use spurs technological innovation and enables viral growth of new technologies.

All of these reforms are critical to 21st century spectrum management and innovation.

2. Flexible Licensed Use

Flexible licensed use means allowing existing licensees to use their spectrum in ways that utilize new technology without having to go back to the government to get permission for each new innovation. A standard requirement is that the new technology does not cause harmful interference to existing licensed users, either by causing co-channel interference (interfering with others on the same frequency) or adjacent channel interference (interfering with others on different frequencies).

One example of allowing more flexible licensed use was in the FCC "wireless cable" proceeding. This proceeding dealt with spectrum in the 2.5 GHz range, which is adjacent to WiFi. Licensees who were using their spectrum for one-way video broadcasting were permitted to use their spectrum for much higher-valued wireless broadband applications such as WiMAX. In congested urban areas, such licensed services may be the best way to proceed in order to encourage deployment, ensure optimal quality of service, and manage interference. WiMAX can be used to distribute signals to WiFi hotspots or it can be used as a longer-reach fixed service. A desktop box with an antenna can become a digital subscriber line (DSL) alternative. WiMAX has enormous potential for benefiting consumers, but it cannot fulfill that potential without spectrum reforms.

Intel has similarly encouraged the FCC to allocate the 3650–3700 MHz band in a manner which would provide access to this spectrum for rural WISPs and promote efficient use of this spectrum in congested Metropolitan Service Areas (MSAs). Specifically, Intel has supported a compromise proposal whereby the FCC would prescribe non-exclusive licensed use in rural areas, and licensed use in the Top 50 MSAs—where exclusive use is necessary to promote investment and quality of service for long range services in congested areas.

3. Unlicensed Use

Allowing more unlicensed use is readily achievable through the exploitation of new technologies that enable unlicensed users to operate in the same spectrum as licensed users of traditional radio technology—without causing harmful interference to those users. Importantly, in May 2004, the FCC initiated the so-called "Vacant TV Channels" proceeding, in which it proposed to allow cognitive radios to overlay channels 2–51 of the TV spectrum. Cognitive radios can discern spectrum use at

²In two-sided auctions, spectrum voluntarily offered by incumbents is auctioned together with any unassigned spectrum. Bidders can efficiently aggregate spectrum that is currently highly fragmented by making all-or-nothing bids on packages of assigned and unassigned licenses. In voucher auctions, incumbents are given auction vouchers in exchange for turning back their licenses. The value of vouchers is determined in an auction of the returned spectrum and unassigned spectrum held by the government.

their location and modify their frequency and power to operate only in spectrum that is “vacant” at any given time.³

Intel filed Comments and Reply Comments in the FCC’s “Vacant TV Channels” proceeding in November 2004 and January 2005, respectively.⁴ Intel’s filings strongly supported the Commission’s proposal to permit operation by new unlicensed wireless devices in the TV “white spaces”—primarily in channels 21 through 51. We continue to work with the FCC to advance this proceeding.

In the meantime, Members of this Committee are seeking to expedite this process. In this regard, Intel commends Chairman Stevens and Senators Allen, Sununu, Kerry, Boxer, and Dorgan for sponsoring the “American Broadband for Communities Act” (ABC Act),⁵ and the “Wireless Innovation Act of 2006” (WINN Act),⁶ respectively. Intel also applauds Senator Smith’s support of legislation directing the FCC to allow unlicensed use of the TV “white spaces.”⁷ The ABC Act and the WINN Act recognize the vast untapped potential of the TV “white spaces.” Intel stands ready to work with the bills’ sponsors and other Members of this Committee and the Congress to move forward on this important issue. Given the timeliness of these bills and their importance to our country, I will devote the remainder of my testimony to detailed consideration of the most important issues in the TV “white spaces” debate.

III. TV “White Spaces”

Requiring the FCC to make the TV “white spaces” available for unlicensed use—as contemplated by the ABC Act and the WINN Act—would be a big step forward in maximizing our Nation’s spectrum efficiency.

A. Significant “White Space”

At almost any location in the U.S., many channels in the TV bands are not being used by licensed services. For example, Intel’s internal analysis estimates that there is a *minimum* of 24 MHz of “white space” in channels 21–51, throughout the New York City TV market—the most congested market in the country.⁸ In areas with fewer TV stations like Honolulu, Hawaii and Charleston, West Virginia, Intel estimates that there is a *minimum* of 114 and 126 MHz of “white space” in channels 21–51, respectively, throughout the TV market. And, in areas like Anchorage, Alaska and Billings, Montana, Intel estimates that there is a *minimum* of 156 and 174 MHz of “white space” in channels 21–51, respectively, throughout the TV market. These “white spaces” represent a significant amount of spectrum that could be easily detected and utilized by cognitive radios for a variety of valuable new wireless applications—thereby providing substantial consumer benefits.

B. Substantial Consumer Benefits

Indeed, the TV “white spaces” could be used to provide significant benefits to consumers.

1. Rural Broadband

For example, this spectrum could offer enormous advantages for wide area wireless broadband services such as WiMAX in rural and other underserved areas. The highly favorable propagation characteristics of the TV spectrum—including the ability to pass through buildings, weather, and foliage—make transmission less dependent on line of sight and better for low-cost deployment in rural and bad weather areas. Compared to the 2.5 GHz frequencies—a likely alternative spectrum band for wireless broadband—the TV spectrum requires fewer antennas and uses less power for a given level of service quality to a given coverage area.

³TCC Paper at 5. Because spectrum use varies by time and location, cognitive radios can use vacant spectrum only temporarily and do so without interference to others, maximizing the number of users and services accessing given frequencies.

⁴Comments of Intel Corporation, *In the Matter of Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04–186, 02–380, Nov. 30, 2004; Reply Comments of Intel Corporation, *In the Matter of Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04–186, 02–380, Jan. 31, 2005.

⁵S. 2332, “American Broadband for Communities Act,” introduced on Feb. 17, 2006, by Chairman Ted Stevens (R-AK), 109th Congress, 2nd Session.

⁶S. 2327, “Wireless Innovation Act of 2006,” introduced on Feb. 17, 2006, by Sens. George Allen (R-VA), John E. Sununu (R-NH), John F. Kerry (D-MA), and Barbara Boxer (D-CA), 109th Congress, 2nd Session.

⁷Remarks of Senator Gordon H. Smith (R-OR), before the American Electronics Association, Cyber Series Luncheon, Washington, D.C., Feb. 8, 2006.

⁸Intel estimates that there is an average of 48 MHz of “white space” throughout the New York City TV market (DMA).

Given its propagation characteristics, the TV “white spaces” could be particularly useful in rural areas. In contrast, we estimate that the 2.5 GHz frequencies would require approximately four times as many base stations to achieve equal geographic area coverage, for a given air interface and bandwidth. The upshot is that opening the TV “white spaces” to unlicensed wireless broadband use could dramatically accelerate broadband deployment in this country. Indeed, the TV “white spaces” could be used to provide better broadband service or a first broadband service in many rural areas.

2. Cutting-Edge Consumer Applications

The TV “white spaces” could also be used to provide new, cutting-edge consumer applications that take advantage of this spectrum’s improved signal reliability and range. Wireless local area networks using low power and battery operated devices could enable new capabilities that bring safety, convenience, and comfort to consumers in their homes and workplaces. For example, such devices could provide improved energy efficiency through intelligent home automation and power monitoring; home security with robust low power wireless video feeds; and other interesting new home entertainment applications. For example, companies such as Dell Inc. are considering some interesting applications for data and video distribution within the home.

3. Public Safety Uses

Additionally, in emergencies, the TV “white spaces” could be used to provide auxiliary services to augment public safety communications on licensed networks. For example, rescue efforts could be enhanced by placing remote video cameras at a disaster site to relay images to a command center; or using portable “helmet cams” to provide real-time, point-of-view command/control information.

C. No Harmful Interference

All of these innovative unlicensed applications are possible without causing harmful interference to authorized users. Indeed, Intel filed detailed technical analyses with its FCC Comments and Reply Comments demonstrating that unlicensed use of the TV “white spaces” is both achievable and practical. These analyses clearly refute the misleading and incorrect claims made by TV licensees that unlicensed use will interfere with their operations.

Furthermore, as both the ABC Act and the WINN Act contemplate, before any new unlicensed devices could be deployed in the TV “white spaces,” they would have to go through the FCC’s rigorous certification process—a process that has been used for years to authorize new devices in this country. Pursuant to the certification process, the device manufacturer will have to demonstrate that the device meets the technical requirements for unlicensed devices to operate in the TV “white spaces.” These technical requirements, including interference criteria, are set forth by the FCC’s Office of Engineering and Technology. No new device could be deployed without first complying with the FCC’s certification process.

1. TV Reception

Permitting new unlicensed wireless devices to share the TV bands would not cause harmful interference to TV reception. To begin, the potential for harmful interference to TV reception by high power “fixed/access” services such as WiMAX is not a concern. Not only are the locations of TV stations known, but also the unlicensed devices can utilize various mechanisms (*e.g.*, frequency coordination, professional installation, and output power control) to preclude any harmful interference to TV receivers.

Moreover, claims that new unlicensed “personal/portable” devices operating in the TV “white spaces” would cause harmful interference to authorized services from out-of-band emission is misleading. Because radiated emissions outside the channel of operation are unintended and unwanted emissions, these devices are not designed to maximize their emissions level. In fact, the actual radiated level emitted by an unlicensed device will almost always be far below the permitted maximum.

In addition, only approximately 15 percent of U.S. homes rely solely upon an over-the-air TV signal. The majority of these over-the-air viewers live in areas of strong signal strength (where the received signal would easily overcome radiated emissions from other household electronics). The remainder of over-the-air viewers—those located in areas of marginal signal strength—receive their signal using an individual- or MATV-based antenna system, which is far removed from the proposed unlicensed devices (and thus is less likely to be susceptible to harmful interference). Further, tens of millions of TV viewers and their neighbors already operate similar electronic devices, which would cause the same type of supposed harmful interference to TV

receivers as the unlicensed devices in question—and, yet, such interference has not been an issue.

For example, numerous devices found in the average American home, such as cordless telephones, WiFi cards, and Bluetooth solutions, are subject to the same levels for unwanted emissions in the TV bands. Operation of these devices has proven to be compatible with TV viewing in American homes for years. Moreover, devices operating in the TV bands, such as common door openers and remote controls, are permitted far higher emissions levels than those allowed under the FCC's proposed rules. Even with these increased emissions levels, the operation of door openers, remote controls, and similar devices does not cause harmful interference to TV reception.

The radiated emissions limits set forth in the FCC's proposed rules for unlicensed operation in the TV "white spaces" already apply to a variety of digital devices, such as personal computers and electronic toys. Operation of these digital devices does not interfere with TV viewing. Furthermore, the limits for these digital devices, as would be found in some office-type environments, have emissions levels that are higher than the level for the proposed unlicensed devices. Even in this environment, both over-the-air and cable- and VCR-connected television receivers operate successfully.

2. Direct Pick Up

Direct pick up (DPU) is the amount of signal a television tuner receives over-the-air, in the absence of an external antenna. The potential for DPU interference in cable-ready television receiving equipment from new unlicensed wireless devices is highly improbable today. In fact, the immunity level for such receiving equipment—*i.e.*, the power level above which interference is perceptible to the viewer—was developed years ago (when TV sets were generally poorly shielded) in order to minimize the effect of interference to cable television (CATV) viewing from over-the-air TV stations.

Indeed, this immunity level was specified more than 20 years ago to accommodate the susceptibility of some older TV set/receiver designs that were prevalent when the rule was written. So-called old school "hot/cold chassis" designs are inherently more susceptible to DPU interference, as the input connection is partially unshielded. The most vulnerable targets for DPU interference are the handful of remaining older TV sets connected to set-top boxes and tuned to channels 3 or 4. However, TV set-top boxes and newer TV receivers do not use the "hot/cold chassis" design; rather, they have fully shielded tuners—which render them nearly invulnerable to DPU interference.

Moreover, local TV stations—the reason for immunity levels—and the new devices in question are quite different in a very important way. Users cannot change the fixed location of licensed high power local TV stations. In contrast, operators of new "personal/portable" devices can and will reconfigure, relocate, or simply disable their equipment to avoid DPU interference in their CATV receiving equipment (similar to how consumers handle cell phone interference with TV and computer equipment today). Thus, the immunity level requirements are not necessary with respect to "personal/portable" devices—because any potential for interference is in the user's control—and thus easily avoided.

Also, industry experience demonstrates the extent of the improbability of DPU interference today. Over the past nine years, as DTV stations have commenced operation, approximately 1,550 new high power broadcast TV stations have begun transmitting, essentially simultaneously. Yet, reports of DPU interference to CATV viewing equipment from even these new powerful transmitters have been negligible.

3. Cable and Satellite

In addition, allowing new unlicensed wireless devices to share the TV broadcast spectrum would not cause harmful interference to cable or satellite TV service. Indeed, because the CATV signal is typically terminated at both ends, there is no interference to CATV operation using RG-6 cable for distribution throughout the home. (RG-6 cable is the most widely used cable for home installation of cable TV and satellite TV systems.) Interfering signal ingress only occurs when one end of the cable is not connected—an unrealistic scenario.

And where a house has multiple CATV outlets in several rooms and some of the outlets are not used, the unused outlets are typically terminated with screw-in terminators. Even where unused outlets are not terminated in this manner and signal ingress occurs to the unused outlets, such ingress will not cause harmful interference to the outlets that are connected to TV receivers because of the high degree of isolation between outputs. Indeed, most multiple outlets are connected to a CATV feed via directional couplers. These couplers have a high degree of isolation between

their “tap” and “output” connections. Furthermore, even where simple hybrid signal splitters are used to connect multiple outlets to a CATV feed, the splitters exhibit high isolation between outputs—and thus does not cause harmful interference to the connected CATV outlets.

Finally, the operation of new unlicensed “personal/portable” devices in the TV bands would not cause harmful interference to DBS systems. The TV bands in question encompass frequencies below 698 MHz, whereas DBS satellite systems use frequencies in the range of 1 GHz to 2.2 GHz on the downlink cable between the DBS Low Noise Block Converter/Feedhorn on the dish antenna and the DBS set-top box. Thus, the proposed unlicensed devices and DBS services use different bands, such that the operation of unlicensed devices in the TV “white spaces” would have no effect on—much less cause possible ingress to—DBS systems.

D. Military and Defense Radar

Notably, spectrum sharing similar to that proposed in the TV “white spaces” bills, is already occurring in far more complex scenarios. For example, the 5 GHz band—which is used to transmit classified military and defense radar signals—now shares spectrum with unlicensed 802.11a (WiFi) radio technology. Such radios switch frequencies when the presence of radar is detected, thus continuing operation without causing interference to the classified signals. Recognizing the benefits of wireless broadband networks at 5 GHz, the FCC worked with NTIA, the Defense Department, and the private sector to allow these sophisticated unlicensed devices to share the 5 GHz band with highly sensitive military and government systems.

This example powerfully demonstrates the public benefits gained when government and commercial spectrum users collaborate to adopt innovative technological approaches to spectrum sharing. Through this collaboration, the private sector was afforded a new unlicensed platform on which to innovate—without interfering with critical military needs. Significantly, the 5 GHz example of spectrum sharing is considerably more challenging than the TV “white spaces” scenario. Indeed, military signals in the 5 GHz band are intended to *not* be detected by other technologies, whereas TV stations are fixed and *easily* detectable by cognitive radios.

IV. Conclusion

In sum, Intel, like consumers, wants broadband and other new technologies to become widespread, high quality, and affordable. Over the years, we have consistently supported policies that encouraged wired and wireless broadband investment and competition. We believe that is what will give consumers the broadband and technologies that they want. In that regard, we believe that modernization of the Nation’s spectrum management system is essential to ensure that the Commission’s policies evolve with the consumer-driven evolution of new wireless technologies, devices, and services.

Allowing more flexible licensed use, as well as more unlicensed use (*e.g.*, in the TV “white spaces”), will enable spectrum users and companies like Intel to innovate and respond to market forces without having to go back to the government and get regulations changed to accommodate every new innovation. Spectrum reforms will enable cutting-edge technologies, as well as higher-powered new uses of existing technologies. With a progressive approach to our spectrum policy, we can drive the innovation that keeps the U.S. economy dynamic and competitive.

The CHAIRMAN. Thank you very much. Our next witness is Robert Hubbard, Secretary and Treasurer of the Association for Maximum Service Television and President and Chief Executive Officer of Hubbard Television. Mr. Hubbard?

STATEMENT OF ROBERT W. HUBBARD, PRESIDENT/CEO, HUBBARD TELEVISION GROUP; VICE PRESIDENT, HUBBARD BROADCASTING, INC.; SECRETARY/TREASURER, ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.

Mr. HUBBARD. Thank you. Thank you very much, Mr. Chairman. I come from a long line of broadcasters. My family, my grandfather started his first radio station in 1923. We have been providing public service to Americans ever since that time.

We currently operate in large cities, such as Minneapolis. We also operate in very rural areas in Minnesota and New Mexico. As

a matter of fact, in order to provide our television service to our markets, we operate over 100 low-power transmitters to provide that service to these very, very small geographic areas. We understand the rural area. We understand the importance of the rural area. We understand the importance of bringing rural broadband solutions to the rural area. We think there are ways to do that. It must be balanced with the importance in the television service. New ideas and new technologies are very important but we can't do them in a way that jeopardizes the fundamental television system that this country has relied upon for so long. This balance can only come with proper engineering, with proper testing, and actual real world, not theoretical, testing and engineering.

There is a huge difference between providing rural broadband opportunities and unlimited access with unlicensed devices. On the one hand, rural broadband solutions, we believe are quite manageable, if done properly. Where as, unlimited access to the unlicensed devices within the television band is quite problematic. Quite frankly, we do not know what the solutions are for that environment.

These interference concerns that we talk about are very real. It is not just the broadcasters. We are not alone. IEEE, the world's leading standard organization has expressed these same concerns. Many consumer electronics companies have expressed these concerns. All of the translators—people who operate translators all across the United States and low power television stations have expressed these concerns. Not to mention the additional interference, will be problematic to news gathering, and sporting events because of interference to wireless microphones. These concerns have been exhibited by all of the major news associations, manufacturers of wireless microphones, and other equipment, and sports leagues.

It is important for us to understand what interference means. It is easy to say interference. What interference means in a digital television world is no television picture, no television service. It is a very, very harsh reality for a home that has that interference. There are at least 20 million homes in this country that rely solely on over-the-air television. Quite frankly, many of them are in rural areas, but they are all over. They are everywhere. There are 73 million homes that have television sets that are not connected to cable and satellite and rely on over-the-air television in some respect. None of the proponents for these unlicensed approaches has really given data. They give theoretical data. They give data in other bands and in other circumstances. MSTV is an engineering organization. It is the only group that has actually provided data in the bands that we are talking about. Let's be clear, what we are talking about is unlicensed devices, which are unlimited in nature and putting them in the television band and potentially interfering with people's television reception. Other unlicensed devices aren't allowed to operate in this band; that is why there has not been a problem with these types of devices in the past. This is a crossroad. This is a fundamental distinction that has never happened before.

The responsibility for interference, the responsibility shouldn't be on the backs of the hundreds of millions of homes in this country, who have hundreds of millions of receiving sets that had been in use and continue to be in use today. It needs to be on the new en-

trants, to make sure that these systems don't disrupt. We need engineering and testing to ensure that interference will not disrupt the American television service. We can't legislate this. It is not just a matter of legislation. This takes invention. It takes creativity. You can't make it happen with a finger snap. This takes everybody working together; industry, government, standards, organizations and importantly, there is a process. IEEE, which is established, IEEE 802.22, which is the wireless standards body, is currently developing a rural broadband solution. As a matter of fact, IEEE has recommended testing of such a system, starting in December of this year. The broadcast industry is a major and active participant in this process and we have continued to be so.

Done prematurely, we run the risk of disrupting American's television service, that has served us so well and can continue to serve us so well in the future. Done incorrectly, we run the risk of bringing no new service. There is no guarantee of new service here in rural areas, and while at the same time completely disrupting those homes that today rely on television for information, news and most importantly emergency information at times of great crisis.

Thank you very much for your time.

[The prepared statement of Mr. Hubbard follows:]

PREPARED STATEMENT OF ROBERT W. HUBBARD, PRESIDENT/CEO, HUBBARD TELEVISION GROUP; VICE PRESIDENT, HUBBARD BROADCASTING, INC.; SECRETARY/TREASURER, ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.

Mr. Chairman and Members of the Committee, thank you for the opportunity to appear before you today to discuss policies affecting the public's spectrum resource and the important services delivered over that spectrum. My name is Robert Hubbard, and I am the President of the Hubbard Television Group, Vice President of Hubbard Broadcasting and serve as a member of the Board of Directors of the Association for Maximum Service Television, Inc. (MSTV).

The issues surrounding spectrum management are important for this Nation. Spectrum is a vital national resource, and must be managed wisely. Today there is considerable debate among economists and legal scholars regarding the best approach to spectrum management. Proponents of an unlicensed approach assert that it will lower the cost to new entrants while preventing interference to licensed services. Leading economists and legal scholars, however, have also voiced strong opposition to an unlicensed model. They believe that such an approach eliminates market discipline for entry, leading to overuse and increased interference among users. Whatever the merits or problems associated with an unlicensed approach, unique issues arise when the government attempts to employ two different regulatory regimes (*i.e.*, licensed and unlicensed) in the same band. Recent proposals would do just that, for the first time attempting to interleave an unlicensed model with licensed broadcast and other services. From an engineering and scientific perspective, the government should approach these unprecedented proposals with extreme caution.

MSTV has over five decades of practical, real world experience in spectrum management. Since 1956, we have worked to maintain and enhance the technical integrity of the American public's free, over-the-air television service as that service grew from less than 100 stations to over 1,600 full-power broadcast stations. We also provided the FCC with the engineering expertise that made it possible to "squeeze in" during the transition channels for DTV service within the current 408 MHz allocation for television broadcasting. MSTV has also assisted policymakers in introducing other licensed services, including public safety communications and sophisticated Part 74 equipment essential to provide live news and sports coverage. And most recently, it helped design the process by which television broadcasters will complete the transition to digital transition (DTV), using the efficiency of digital technology to enable migration from the current band (channels 2 through 69) to the final condensed "in-core" band (channels 2 through 51). As a result, the television broadcast service will occupy only 294 MHz of spectrum as of 2009, in comparison to the more

than 700 MHz of spectrum already available to unlicensed devices at or below the 5 GHz band.

The peaceful coexistence of so many licensed services in the same spectrum band has not happened by accident; it has required careful planning that takes into account the unique architecture of broadcast television service and the interference characteristics of the different services. Based on its knowledge of the difficulties in coordinating licensed services in the same band, MSTV is deeply concerned by proposals to allow an unlimited number of *unlicensed* devices into allegedly “vacant” channels within the spectrum reserved for the public’s free, over-the-air television service. Studies and field tests conducted by well-respected scientists and engineers show that the introduction of *unlicensed* devices into the television broadcast spectrum threatens to create significant interference to the public’s television service. As a result, the unlicensed devices proposal would unfairly burden the over 21 million households that rely exclusively on free, over-the-air television services—a group which disproportionately includes minority, lower income, and elderly persons. In fact, these proposals threaten to create interference to approximately 73 million existing television sets that rely on an antenna to receive over-the-air television service. We are especially concerned about the interference to new digital television receivers and the government-subsidized digital-to-analog converter box program. Finally, by interfering with licensed production equipment in the broadcast bands, it would undermine coverage of emergency news, sports, political, and other events of importance to local communities. Licensed public safety services using broadcast spectrum in many major markets would also suffer.

When asked about these concerns, the relatively small but vocal group of unlicensed device advocates tells policymakers: “trust us.” MSTV respectfully submits that the public’s spectrum resource should be managed based on facts and engineering science, not on unsubstantiated promises. This Committee should take note of the world’s leading industry standards body, IEEE 802.22, which is currently determining whether, and if so, how, new wireless services can safely be authorized to operate in the broadcast spectrum. Proposals that would force the FCC to introduce unlicensed devices into the broadcast spectrum in as little as *six months* would short change the scientific discovery process, short circuit the IEEE’s important work and would wrongly prejudge complicated engineering questions. Once millions of unlicensed devices are placed into the marketplace and allowed to populate the spectrum, they cannot be removed. MSTV accordingly believes it would be unwise to place unlicensed devices into the broadcast spectrum before it is even known whether those devices can safely coexist with the important licensed services which are delivered to the public over that spectrum.

I. Congress Should Protect Consumers by Preserving the Technical Integrity of the Free, Over-the-Air Television Service.

All too often, public policy debates regarding spectrum management deal with abstract concepts like “interference” and “spectrum efficiency.” The impact of these proposals, however, is very real. At stake are the television sets that exist in every living room, bedroom and kitchen across America. Most television receivers have not been engineered to protect against interference from unknown, unlicensed devices operating on adjacent channels in the television band; rather, they were designed to accommodate licensed services that operate in conformity with the FCC’s channel allocation plan. For the American consumer, interference from unlicensed devices is not an abstract concept. In real terms it means that the DTV set one family just purchased will not work when their neighbor turns on an unlicensed wireless device. It means that a new government-subsidized converter box will not work well when it is connected to another family’s analog set.

Parties urging for the introduction of unlicensed devices into the television broadcast spectrum have argued that Congress should not be concerned with the significant interference potential of such devices because Americans can turn to pay television services for programming. These erroneous claims overlook the continued importance of over-the-air television viewing to the American consumer.

Approximately 21 million households¹ with an aggregate 45 million sets rely solely on free, over-the-air television.² Those viewers rely exclusively on over-the-air television for local news, sports, weather, and entertainment. In times of emergency, their lives may be saved when local television stations disseminate critical information from government officials to members of a community, including to viewers receiving that information via portable television sets commonly used during emergencies.³ For example, when it became evident that Hurricane Katrina was headed towards the Gulf Coast, local television stations began wall-to-wall hurricane coverage, alerting the local community about the impending dangers and urging residents, including those in New Orleans, to evacuate.⁴ Once the hurricane made its

devastating landfall, local broadcasters remained a key link between government officials—including the governors of Louisiana, Mississippi, and Alabama—and the public by working cooperatively and creatively to maintain an on-air presence and thereby keep both local residents and the country informed of the severe crisis that followed the hurricane.⁵

When access to a free, over-the-air signal is curtailed by over-the-air interference in favor of a pay service, some viewers experience that loss greater than others. For example, in some markets the number of homes not connected to cable or satellite services may reach as high as 40 percent. Variations may also occur along cultural lines. Univision has reported that nationwide, 33 percent of Hispanic households receive their programming solely over-the-air.⁶ Over-the-air viewers should not be deprived access to these critical local services merely because they do not, or cannot, subscribe to a pay television service.

Cable and satellite subscribers are also affected by loss of free, over-the-air television service. As the General Accounting Office (GAO) has reported, over ten million households that subscribe to cable have *at least* one television set that is not connected to cable.⁷ Added to the sets in homes solely relying on over-the-air service, there are an estimated 73 million television sets not connected to a pay television service in the U.S.⁸

Protecting the spectral integrity of the broadcast service is particularly important as the country enters a critical stage in the transition to digital television. Congress, the Executive Branch, and the FCC have all made clear that bringing the digital transition to a successful conclusion is of utmost priority and that it should not be obstructed by lower-priority goals. Years of hard work by broadcasters, government officials, consumer electronics manufacturers, and others have seen considerable progress, with nearly all 1,600 television stations in the Nation's 208 television markets now broadcasting a digital signal.⁹ With the transmission side of the equation—broadcast facilities—virtually complete, the critical factor is to create incentives for American consumers to turn off their analog television receivers and switch to receiving signals in a digital format by the February 17, 2009 “hard date” on which analog broadcasts are to cease. But if unlicensed devices degrade consumers' ability to receive DTV signals, adoption of digital sets will slow, undermining the DTV transition.

Concerns about the digital transition also extend to the development of an inexpensive digital-to-analog converter box that will ensure continued local broadcast service for consumers' with analog sets. (As was widely reported last year, MSTV and NAB have entered into an agreement with LG Electronics and Thomson Inc. to develop a high-quality but low-cost prototype of such a box.) In recognition of such a box's importance to concluding the digital transition, Congress has allocated \$1.5 billion to subsidize consumers' purchase of converter boxes. Like any receiving device, these boxes must use antennas to receive local television signals, and therefore will be susceptible to interference, as well the analog sets to which the boxes are connected. And to meet Congressional expectations that these boxes remain low cost, there is little room to include additional filters or tuner selectivity. Even if additional funds were available, absent knowledge of the types of unlicensed services that will be operating in the band, it is difficult, if not impossible to include design changes to the box to further immunize the box from future interference.

In light of the importance of maintaining the public's access to free, over-the-air television services both during and after the digital transition, Congress should not use the broadcast spectrum as a testbed for risky experiments in new spectrum management methods. Any proposal to introduce new untested and unlicensed wireless technologies into the broadcast spectrum must contain meaningful mechanisms to avoid interference. As discussed below, no such mechanism exists today.

II. Unlicensed Devices Would Interfere with Consumer Reception of Over-the-Air Broadcasts and Other Licensed Services in the Band.

A. Existing Technology Would Not Prevent Unlicensed Device Operation on Occupied TV Channels.

A key, but faulty, assumption of the proposal to allow unlicensed devices to proliferate through the broadcast spectrum is that technology exists by which an unlicensed device can reliably detect when a television channel is “vacant.” In fact, there is no demonstrated technology that can reliably prevent an unlicensed device from transmitting on a television channel already in use. Thus, in many circumstances, unlicensed devices would operate on channels that are already occupied by local television or other licensed services, including wireless microphones that are used in the production of emergency news coverage, sporting events, and political conventions.

Most proponents of the unlicensed devices proposal rely on “spectrum sensing” methods as the only *potentially* reliable method for protecting the public’s television service from unlicensed device interference. A device using this exploratory technology would “sense” the presence of a television signal and would then, allegedly, select a channel not in use. Yet these “spectrum sensing” technologies are wholly unproven in the broadcast context, especially in light of the uniquely open and diverse architecture of television sets.

As Motorola cautioned in public statements to the FCC concerning the unlicensed devices proposal, “It would be premature to rely on spectrum sensing until these mechanisms are shown to be reliable via comprehensive study and real-world testing.”¹⁰ Policymakers should not base real-world policy decisions on unproven promises of technology to come.

For example, efforts to develop spectrum sensing technology in the 5 GHz unlicensed band took several years of development and testing, even though in that band the task of “sensing” licensed users is far less complex than it would be in the television broadcast band. There, unlicensed devices are to be allowed to operate alongside licensed military radar through use of dynamic frequency selection (DFS). Development of DFS should have been relatively simple, given that a single user, the Federal Government, controlled both the transmission and receiving equipment for the licensed service. Indeed, prior to the FCC’s decision to adopt the new rules allowing unlicensed device operation in the 5 GHz band, the National Telecommunications and Information Administration (NTIA) had submitted detailed procedures by which these unlicensed devices would be tested to determine if they could reliably detect military radar.¹¹ Yet only last month, after three years of analysis and field testing, did the NTIA, Department of Defense, and the FCC reach agreement on criteria allowing sale of unlicensed devices operating alongside the military radar.

The significant efforts undertaken to permit the use of DFS in the 5 GHz band would pale in comparison to the task that would be needed to create reliable spectrum sensing solutions in the television broadcast spectrum. For example, unlike military radar in the 5 GHz band, there are literally thousands of variants among the receiving equipment (*i.e.*, TV sets and Part 74 devices) at issue in the broadcast spectrum; this is a reflection of the unique open architecture of television receivers. Without reliable and consistent information about the receiving equipment, there can be no way of knowing whether an unlicensed device can detect a channel where its operation will not interfere with nearby viewers’ television sets or Part 74 devices. Furthermore, in the broadcast spectrum there are full-power broadcasts, low power broadcasts, and licensed broadcast auxiliary stations (which are essential to the delivery of on-the-spot news coverage during weather disasters, public safety emergencies, political conventions, and sporting events). A spectrum sensing method would have to reliably sense *all* of these services.

Perhaps most importantly, as even Intel has recognized, in its opposition to the use of spectrum sensing spectrum for higher power unlicensed operations in the 3650 to 3700 MHz band, sensing “works well for short range, low power applications like WiFi where control resides in one entity or operator-to-operator voluntary co-operation is feasible.”¹² The broadcast spectrum, however, exists below 1 GHz, where propagation characteristics allow transmissions—and interference—to travel over very long distances, passing through thousands of independent locations. Indeed, proponents of the unlicensed devices proposal have made clear that they would use the broadcast spectrum to deploy very *long-range* applications.¹³

B. Field Tests Show That Even an Unlicensed Device Operating on a Genuinely “Vacant” TV Channel Would Interfere With Viewers’ Access to Local Television Services.

Even if technology were to develop that would allow unlicensed devices to properly detect when a given television channel is “vacant,” significant problems would remain. In consultation with one of the most respected broadcast laboratories in North America, Communications Research Centre Canada (CRC), MSTV has developed and conducted a reproducible laboratory study to measure the effects on a television receiver of an unlicensed device operating on a genuinely “vacant” TV channel.¹⁴ This study shows that harmful emissions from unlicensed devices—even when the devices operate on “vacant” channels would seriously harm the public’s access to free, over-the-air television services and would prevent the use of licensed wireless production equipment critical to the coverage of local news, sports, and other events.

Indeed, unlicensed devices operating in the broadcast spectrum at the FCC’s allowed power levels for out-of-band emissions (*i.e.*, energy that an unlicensed device radiates outside of its operating channel) could prevent a viewer from watching

over-the-air television even when the device is as far as *78 feet* from a digital TV set, or *450 feet* from an analog set, despite the presence of multiple walls between the device and the TV set (as would occur in multi-unit dwellings). Comments filed with the FCC by parties such as Motorola and the Consumer Electronics Association have seconded these concerns about out-of-band emissions from unlicensed devices.¹⁵ It is noteworthy that IEEE 802.22 agrees with these concerns regarding out-of-band interference.

To ensure the reliability and credibility of the study, CRC and MSTV have extensively documented the methodology used and results obtained, and have submitted that documentation to the FCC.¹⁶ MSTV subsequently produced a video, entitled “Your Neighbor’s Static,” which recreated the CRC/MSTV study in a real-world environment just outside Washington, D.C. Using an actual townhouse and actual DTV and analog receivers, this video showed the harmful effect of an unlicensed device operating on a “vacant” television channel on reception of over-the-air broadcasts.¹⁷

The CRC/MSTV field study remains the only real-world test of the effects of unlicensed devices out-of-band emissions on licensed television services. The unsubstantiated promises of unlicensed device advocates cannot substitute for hard, scientific data, and this data is clear: the placement of unlicensed devices into the public’s broadcast spectrum would significantly harm the public’s local television service.

III. Once Interference Occurs, There is No Enforcement Mechanism To Stop it.

Compounding the serious flaws described above, once unlicensed devices are in the field, broadcasters and the FCC would have no reliable means of protecting the public’s television service from harmful interference. Although as a legal matter the FCC’s Part 15 rules would privilege the licensed broadcast uses over the unlicensed transmissions in an interference dispute, as a practical matter this precedence would be of little value.

Rarely will broadcasters, the FCC, or the public even be aware of harmful interference from unlicensed devices, because most cases of interference from unlicensed devices will go unreported. If unable to receive a station’s signal, viewers may simply assume that the interference is caused by a problem with the broadcaster’s transmission or their sets. They are more likely to change the channel, or return a new DTV set to the store, than they are to call the broadcaster. It may thus take years before anything approaching the full impact of interfering unlicensed devices on the public’s access to free, over-the-air television would come to light.

Even when interference is reported and linked to unlicensed devices, the FCC would not typically be able to find and shut down the interfering devices.¹⁸ Just as spectrum sensing technology cannot reliably *prevent* interference, it should not be relied upon to *police* it.¹⁹ Attempts to use traditional means to remedy harmful interference from unlicensed devices (*i.e.*, finding the offending transmitter and ordering it to cease operation) would sap both FCC and broadcaster resources, especially as the number of devices out in the field proliferates. As Sprint has told the FCC, “once interfering unlicensed devices are in the market, it will . . . potentially be virtually impossible for the [FCC] to recall these devices.”²⁰

IV. The Aggregation of Unlicensed Devices in the Broadcast Spectrum Could Ultimately Leave the Spectrum Unusable for All Parties.

Even if out-of-band emissions could be controlled and the unlicensed devices could avoid transmitting on occupied channels, a fundamental problem would remain: with an *unlimited* number of unlicensed devices allowed to crowd the broadcast spectrum, the quality of broadcast and other licensed communications over that spectrum will necessarily decline. Although the addition of one or two unlicensed devices in a given region may not have an appreciable effect, the addition of hundreds of thousands or millions certainly will. This trend would be irreversible and continually escalating. Maintaining a low noise floor is critical if Congress is to uphold its longstanding commitment to a robust, universal, and free over-the-air television service.

As William J. Baumol, a professor of economics at New York University, has explained in an influential 2005 paper, the “policy of unlimited entry” that is the hallmark of an unlicensed device regime “is likely to have the same detrimental effects upon spectrum usage that it has on usage of shared resources elsewhere.”²¹ Over time, a “tragedy of the commons” results in which the resource (*e.g.*, spectrum) is shared among so many users as to make it of little value for anyone. As Dr. Baumol notes, “interference is inevitable under a spectrum regime in which the market is not constrained by any restrictions that limit entry: in deciding whether or not to enter, each entrant takes into account only the consequences of this decision upon

himself, and disregards the effects upon others.”²² The result is “overcrowding and overuse.”²³ Experience in the unlicensed 2.4 GHz band is instructive. There, cordless phones have “reap[ed] devastating effects on 802.11b WLANs” because the technologies used are not compatible for minimization of interference.²⁴

Even if future technology is able to accommodate some number of additional users within a given swatch of spectrum, demand will surely keep pace and the quality of communications in the spectrum will degrade.²⁵ As the economist Thomas Hazlett has noted, the history of unlicensed device entry is a “chase up the dial: the 900 MHz ISM band became congested, leading the FCC to open up the 2.4 GHz unlicensed band, which became crowded in major markets, leading the FCC to open up 300 MHz for the U-NII 5 GHz band.”²⁶ And once the decision is made to turn a band over to an infinite quantity of unlicensed devices, the spectrum cannot be recaptured for future productive use. The television broadcast spectrum should not be allowed to go the way of other spectrum that has suffered a tragedy of the commons.

V. Spectrum Is Not Readily Available in Congested Urban and Many Other Markets.

Driving the unlicensed devices proposal is another mistaken assumption, reflected in a paper issued by the New America Foundation (NAF) and Free Press last year: that large swaths of television broadcast spectrum are “vacant” and thus available for use by unlicensed devices. In fact, studies demonstrate that there is little or no white space available in congested urban and even many less populated markets.²⁷ The benefits cited by promoters of the unlicensed devices proposal—“free[ing] up unused capacity for innovative new wireless applications”—would thus fail to materialize in many areas throughout the country.²⁸

What has caused unlicensed device advocates like NAF/Free Press to so overestimate the amount of “white space” available? Most notably, they ignore the minimal interference guidelines for determining a “vacant” channel, as proposed by the FCC in its unlicensed devices proposal in 2004 and recommended by IEEE. Once the FCC’s more appropriate interference methodology is applied, most of the “white space” diminishes significantly, especially in urban and suburban areas. For example, as MSTV noted in filings before the FCC, there are very few white spaces available from Boston to Washington, D.C. during the digital transition. Even after the DTV transition, spectrum may be tight, because the television band will be reduced by nearly one-third. For example, in Dallas-Ft. Worth, where NAF/Free Press claims 120 MHz of television spectrum to be “vacant,” only 6 MHz is actually available.

Even in rural markets where some white space may be available, there is potential for interference with the existing television broadcast service. Because of their distance from transmitting towers, many rural viewers receive very weak signals. To correct this weak signal condition, rural viewers often use amplified antennas. As a result, their receiving equipment is more susceptible to interference than typical antennas. This is one reason why the National Translator Association has expressed concern about allowing unlicensed devices in rural areas.

The unlicensed devices proposal also threatens to conflict with another priority for rural viewers: the digital transition for low-power and TV translator stations, which is unlikely to be complete when full-power analog broadcasts cease in 2009. Currently, 2,100 licensed LPTV and 4,700 licensed television translator stations are eligible to “flash cut” to digital operations, and in May the FCC will open a filing window by which these stations can seek a companion digital channel. Before taking any action that may disrupt that complex transition, Congress should take notice that the rural areas into which Intel and other parties suggest unlicensed devices would be deployed depend heavily upon low power television services. As FCC Commissioner Adelstein has stated: “[t]housands of translators and low power stations across our country fill a vital need as the primary source of over-the-air television for people in Rural America. As I’ve seen firsthand, often these stations are the only station in an area providing local news, weather, public affairs and emergency programming.”²⁹ Those same viewers would be deprived of digital low power television services if unlicensed devices are prematurely introduced into the broadcast spectrum before the digital low power transition is complete.

Moreover, the broadcast industry is currently faced with a crisis over the availability of spectrum to provide live remote coverage of news and sporting events. As MSTV has noted on previous occasions, broadcasters depend heavily on wireless microphones and cameras to provide live coverage of major events.³⁰ Under carefully controlled and coordinated conditions, these wireless devices currently use the “vacant channels” in the UHF band to operate. However, these channels are used heavily, making it difficult in major markets to find sufficient spectrum for the proper operation of wireless microphones. As a result, broadcasters are already ex-

periencing significant obstacles to covering events of local and national importance. The unlicensed devices proposal would put wireless microphones in conflict with unlicensed devices for scarce spectrum. Thus, operation of unlicensed devices in the broadcast band would seriously undermine local stations' ability to use existing wireless production devices and provide remote coverage of important events, including local emergencies such as weather disasters.

On behalf of MSTV, I again wish to thank the Committee for the opportunity to discuss important matters of spectrum reform and their relationship to the public's free, over-the-air television service. As demonstrated by the progress in the DTV transition, which will free up 108 MHz of spectrum for new wireless and critical public safety communications, local broadcasters are committed to efficient utilization of the public's spectrum resource. Spectrum efficiency, however, requires careful attention to the interference potential of services sharing the same spectrum band. To simply open the floodgates to unlicensed devices without resolution of the significant technical concerns described above would harm the public's interest in interference-free communications and the continued access to free, over-the-air television services. MSTV accordingly urges that any significant changes in use of the broadcast spectrum be made only *after* the FCC and respected organizations like IEEE 802.22 have designed and tested appropriate interference standards.

The Appendix attachments, to this prepared statement, have been retained in Committee files.

ENDNOTES

¹*Estimated Cost of Supporting Set-Top Boxes to Help Advance the DTV Transition: Testimony Before the Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, U.S. House of Representatives*, Statement of Mark L. Goldstein, Director, Physical Infrastructure Issues, GAO, 7–8 (Feb. 17, 2005) (GAO Study). *See also* Comments of NAB and MSTV, MB Docket No. 04–210, *passim*, Attachment A (NAB/MSTV OTA Comments).

²NAB/MSTV OTA Comments at 2.

³Because they are typically battery powered, these sets are crucial when natural or manmade disasters leave viewers without access to power. As one report recently noted, “[I]n states in the hurricane belt . . . small, battery powered TVs have become must-have items to have during power outages.” *Satellite Business News* 2, July 11, 2005.

⁴A video documenting these efforts of local television broadcasters in the Gulf Region may be viewed online at <http://www.mstv.org/honoring.html> (“*Gulf Region Video*”).

⁵For example, after the New Orleans levees broke, WWL-TV maintained an on-air presence by relocating news operations to a broadcast facility at Louisiana State University, and later to noncommercial station WLPB in Baton Rouge. Similarly, after floodwaters overtook New Orleans station WDSU's facilities, nineteen of the station's employees relocated to Hearst-Argyle sister station WAPT in Jackson, Mississippi. WDSU's signal was then sent from Jackson to a backup TV transmitter in New Orleans, as WDSU's primary transmitter was under water. *See, e.g.*, Craig Johnson, *Hurricane Katrina Tests Broadcasters: Gulf Coast Area Stations Improvise in Order to Stay on the Air*, *TV Technology*, Sept. 21, 2005, at http://www.tvtechnology.com/features/news/n_hurricane_katrina.shtml (last visited Jan. 23, 2006).

⁶Comments of Univision Communications, Inc., in MB docket No. 04–210 at 8, August 11, 2004.

⁷GAO Study at 8.

⁸NAB/MSTV OTA Comments at 5.

⁹*Mass Media Notes*, *Communications Daily*, Feb. 26, 2004 (quoting an NAB spokesperson as reporting 1,155 local stations on air in digital). That number has presumably risen in the nine months that have passed since NAB's report.

¹⁰Comments of Motorola, ET Docket Nos. 04–186 and 02–380, at 8 (filed Nov. 30, 2004.)

¹¹*See* Comments of NTIA, ET Docket No. 03–122, at App. B (filed Oct. 1, 2003).

¹²Petition for Reconsideration of Intel Corp., ET Docket No. 04–151 (filed June 10, 2005).

¹³*See, e.g.*, Comments of Microsoft Corp., ET Docket Nos. 02–380 and 04–186, at 6 (filed Nov. 30, 2004) (alleging that “some [unlicensed] WISP signals could travel over 31 kilometers” using the television broadcast spectrum).

¹⁴*See* Appendix A.

¹⁵ See Comments of Motorola, ET Docket Nos. 04-186 and 02-380, at 12 (filed Nov. 30, 2004); Comments of CEA, ET Docket Nos. 04-186 and 02-380, at 9 (filed Nov. 30, 2004).

¹⁶ See Comments of MSTV and NAB, ET Docket Nos. 02-380 and 04-186, Ex. A (filed Nov. 30, 2004).

¹⁷ See Appendix B for a technical description of the demonstration.

¹⁸ See, e.g., *High-Tech Companies Defend FCC's Part 15 Regulatory Scheme*, FCC Report, June 14, 2002 (citing experience of amateur radio systems, which share spectrum with WiFi devices, that the obligation of unlicensed devices to cease operation if they cause harmful interference to licensed operations "is an allusion.").

¹⁹ SPTF Report, at 58 ("[O]nce unlicensed devices begin to operate . . . it may be difficult legally or politically to shut down their operations even if they begin to cause interference or otherwise limit the licensed user's flexibility."); *Review of Part 15 and Other Parts of the Commission's Rules*, 17 FCC Rcd 14063, 14067 (2002) (describing interference caused by unlicensed radar detectors to VSATs in the 11.7-12.2 GHz band, and noting that the radar detectors could not easily be identified or, even if identified, controlled).

²⁰ Sprint Reply Comments, ET Docket No. 02-380, at 2 (filed May 22, 2003).

²¹ William J. Baumol, *Toward an Evolutionary Regime for Spectrum Governance: Licensing or Unrestricted Entry?*, AEI-Brookings Joint Center for Regulatory Studies, 10 (April 2005).

²² *Id.* at 11.

²³ *Id.*

²⁴ *Interference from Cordless Phones*, WiFi Planet, April 15, 2003, available at <http://www.wi-fiplanet.com/tutorials/article.php/2191241> (last visited Nov. 21, 2004).

²⁵ Baumol at 11.

²⁶ *Id.*, quoting Thomas W. Hazlett, *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase's "Big Joke": An Essay on Airwave Allocation Policy*, 14 Harvard J.L. & Tech. 335, 429 (2001).

²⁷ The attached Appendix C includes a study by the respected engineering firm of Meintel, Sgrignoli & Wallace concerning the scarce amount of "white space" available in many markets.

²⁸ See Comments of Wireless Unleashed, ET Docket No. 04-186, at 1 (filed Nov. 30, 2004).

²⁹ *Amendment of Parts 73 and 74 of the Commission's Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to Amend the Rules for Digital Class A Television Stations*, 19 FCC Rcd 19331 (2004), Separate Statement of Commissioner Jonathan S. Adelstein, Approving in Part and Concurring in Part.

³⁰ See, e.g., Letter from David L. Donovan, President, MSTV, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 02-380 (filed June 23, 2003) (attaching transcript of video demonstrating concerns with the availability of spectrum for wireless microphones).

The CHAIRMAN. Thank you, Mr. Hubbard. Our next witness is Thomas Sugrue, who is President of Government Affairs of T-Mobile USA. Mr. Sugrue?

**STATEMENT OF THOMAS J. SUGRUE, VICE PRESIDENT,
GOVERNMENT AFFAIRS, T-MOBILE USA, INC.**

Mr. SUGRUE. Good morning again. First, I would like to extend my sympathy and condolences to Senator Inouye on the loss of his wife. Our thoughts and prayers are with him as well. I want to thank the Committee for the opportunity to appear here this morning and talk about issues affecting spectrum and other things affecting the wireless industry, which are keen interests to T-Mobile.

I want to focus my remarks just on two issues. First, it is essential that more spectrum be introduced into the marketplace at the earliest possible date for existing and new providers that deploy advanced innovative wireless services that consumers demand. We respectfully request the Committee to do everything within its

power to ensure that the AWS auction stays on track for June 29 of this year.

Second, Congress's policy of regulating wireless services with a light touch and at the Federal level has been a tremendous success. We ask the Committee as it discharges both its legislative and oversight responsibilities to build on this success and continue to emphasize that this is the right approach for the regulation of the wireless business.

First, on the need for more spectrum, like Mr. Kneuer, I would like to congratulate the Chairman and this whole Committee for its leadership in the passage of the Commercial Spectrum Enhancement Act in December of 2004. This Act, by creating a trust fund for auction proceeds to pay for the relocation of government users in the AWS band, set the stage for an auction of AWS licenses this summer. And similarly, through this Committee's leadership just recently, Congress set a deadline for the transition to digital television accelerating the auction of spectrum in the 700 MHz band for new broadband services.

Mr. Chairman, I will say in my 25 years in this business, I don't think I have ever seen two such major pieces of legislation passed in two consecutive sessions of Congress that will have such a profound impact on the wireless business. So, that is an extraordinary accomplishment and congratulations to all of you.

Combined, these two actions will result in 150 MHz of new spectrum being auctioned for advanced services. It will be put into use during the next 3 years. This spectrum is critically important for competition and innovation. Just for example, T-Mobile is the fourth largest nationwide wireless carrier, but as such we have less spectrum in most markets than most of our major competitors. In part, as the result of recent mergers and consolidations, the three largest carriers hold on average between 42 and almost 60 MHz of spectrum in the top 50 markets. T-Mobile holds on average about 25 MHz in these areas. We need access to more spectrum soon, as do other mid-size and smaller carriers to roll out next generation services. For this reason it is critically important that the AWS auction proceed on time.

We applaud Chairman Martin and the FCC for announcing an auction start date of June 2006. However, the Commission is also considering proposals to alter the auction structure, eliminate transparency and bidding, and amend the rules for participation by small business entities. We look to the Committee to encourage the FCC to resolve these issues without delay. We have views on each of these issues, but we think it is critically important, no matter how they come out, that they be resolved promptly so that the auction can proceed on time.

Second, in addition to ensuring the swift release of spectrum, Congress should continue to recognize that a light touch Federal regulatory model is best suited for the competitive wireless industry. In 1993, Congress had a unique vision to create a competitive and deregulatory environment for wireless communications. It preempted state regulation of rates and entry for wireless carriers, and it directed the FCC to exercise its authority only where clearly needed. Results have been dramatic in terms of growth and the

value this industry and these services are bringing to American consumers today.

As Congress recognized wireless services are provided nationally without regard to state boundaries. Notwithstanding this, some state commissions and legislatures are seeking to dictate what a wireless bill should look like, how to explain charges, and the precise language carriers should use in marketing services.

Divergent state requirements can overload the customer, increase costs of providing service, and in some cases, permit the state with the most burdensome regime to effectively set policy for the entire country. It also could prevent companies like T-Mobile from distinguishing themselves in the marketplace through its own high quality service and products.

Now, I am not saying the wireless industry is perfect, far from it. I think it is true that all new industries experience some growing pains, particularly one growing as fast as wireless. But I am saying it is a dynamic competitive industry and that there is no evidence of systemic market failure that would support extensive government intervention.

So, for these reasons we encourage Congress as it considers reform of the Communications Act and exercises oversight of the FCC to affirm that a Federal regulatory framework should apply to wireless services.

Thank you again for inviting me here today. I will be happy to answer any questions.

[The prepared statement of Mr. Sugrue follows:]

PREPARED STATEMENT OF THOMAS J. SUGRUE, VICE PRESIDENT, GOVERNMENT AFFAIRS, T-MOBILE USA, INC.

Good morning, Mr. Chairman, Co-Chairman Inouye, and Members of the Committee. My name is Tom Sugrue and I am the Vice President of Government Affairs for T-Mobile USA, Inc. Thank you for the opportunity to appear before the Committee to discuss spectrum and other wireless issues critical to T-Mobile and the wireless industry as a whole. T-Mobile is an independent national provider of wireless voice, messaging and data services. In addition, T-Mobile operates the Nation's largest commercial WiFi wireless broadband network with service in more than 6,700 public locations across the country under the name T-Mobile HotSpot.

While T-Mobile is the smallest of the four nationwide wireless carriers in the United States, its growth during the past several years has been remarkable. When I joined the company in 2003, it had just passed the 10-million subscriber mark. We now have more than 22 million subscribers, an increase of 120 percent in just three years. This makes T-Mobile the country's fastest growing national carrier in terms of rate of growth. We believe this growth is attributable in large part to T-Mobile's focus on excellent customer service and its efforts to improve coverage, including the addition of 3,500 new cell sites in 2005 alone. These pro-consumer measures are paying off. For two years running, T-Mobile has finished first in overall customer satisfaction among all wireless carriers in the J.D. Power and Associates rankings.

I would like to focus this morning on two main points.

First, it is essential that more spectrum be introduced into the marketplace at the earliest possible date in order for existing and new providers to deploy the advanced and increasingly innovative wireless services that consumers demand. We respectfully request that the Committee do everything within its power to ensure that the advanced wireless services (AWS) auction stays on track for June 29, 2006.

Second, Congress' policy of regulating wireless services with a light touch at the Federal level has been a tremendous success. The extraordinary growth and dynamism in wireless services in the last 10 years are due in no small part to decisions Congress made to adopt a pro-competitive, deregulatory model for the industry. However, there have been recent attempts by state legislatures and regulatory commissions to become entangled in the details of the customer-carrier relationship, in-

cluding specifying the size of fonts used on bills and advertisements, establishing the length and nature of contracts, and prohibiting a variety of charges. These types of regulations all limit customer choice, add to confusion—not clarity—and raise the cost of providing services, ultimately harming the consumers the states are trying to protect.

More Spectrum Is Necessary

I think I can speak on behalf of the entire wireless industry in saying that we sincerely appreciate the Committee's efforts to ensure that more spectrum is swiftly put into circulation. In particular, I want to applaud the Chairman, Senator Inouye and the Committee for taking the lead in successfully pushing for passage of the Commercial Spectrum Enhancement Act in December 2004. That Act established a trust fund to relocate government users in certain bands and has allowed the auction for AWS licenses to take place this summer. Similarly, through this Committee's leadership, Congress just last month set a date certain for the transition to digital television broadcasting, thereby accelerating the auction of 700 MHz spectrum for new broadband communications services.

These two pieces of legislation will result in 150 megahertz of spectrum being auctioned and licensed for wireless broadband, and put into service during the next three years. These infusions of spectrum are especially important for the overall competitiveness of the industry. For example, as the fourth largest nationwide wireless carrier in the United States, T-Mobile has significantly less spectrum in most markets than the three largest national carriers. Indeed, in part as a result of recent mergers and acquisitions, the three largest carriers hold an average of between 42 and almost 60 megahertz in the top 50 markets, while T-Mobile holds only about 25 megahertz on average in those areas. To continue to be an aggressive competitor, as well as to satisfy consumer demand for an increasing range of affordable, next generation wireless services, T-Mobile needs access to additional spectrum in the very near future. Many other mid-size and smaller carriers are in the same position.

For this reason, it is essential that the AWS auction proceed on schedule. The licenses on the auction block are the most desirable and readily usable frequencies that have been made available for wireless services in 10 years. They encompass 90 megahertz of spectrum and provide a footprint across the entire country. The AWS auction is likely to be one of the most successful ever held, in terms of the number and variety of participants, as well as dollars generated for the public benefit. The substantial spectrum advantage enjoyed by the three largest wireless carriers, and the increasing demand for mobile wireless offerings, underscore the need to put valuable AWS spectrum into the marketplace as soon as possible to promote continued competition and product choice for advanced services.

The FCC has announced an auction start date of June 29, 2004. Chairman Martin and the other Commissioners have indicated their intent to keep this date, and we applaud them for that. At the same time, the Commission is considering proposals to alter the auction structure, eliminate transparency in bidding, and amend rules for participation by small business entities. We look to the Committee to support and to encourage the Commission to resolve these issues promptly so that they do not have the unfortunate consequence of delaying the June 29 start date. The FCC is working hard to keep the auction on track, but some pending proposals are controversial and we are concerned that they not be allowed to sidetrack the most important auction fueling competition in more than a decade.

Too many entrants depend on its successful outcome, including the Department of Defense and government agencies awaiting relocation, and companies like T-Mobile and the public safety community that are waiting to rollout new, third-generation wireless services to benefit consumers and competition.

In addition to ensuring the swift release of spectrum to market, Congress should continue to recognize the innovative and competitive services that the wireless industry has been able to offer since 1993. Congress had a unique vision to create a deregulatory environment for wireless communications when it passed the Omnibus Budget Reconciliation Act of 1993. In doing so, it also created a vibrant and competitive communications marketplace that empowered customers, not the government, to pick "winners and losers." Just look at the results. Since 1993, the number of wireless subscribers has shot up from 13 million subscribers to more than 200 million today. The average minutes of use per subscriber has increased more than 500 percent, while prices per minute have dropped more than 80 percent. Wireless customers sent 32.5 billion SMS messages in the first half of 2005. And every day, customers rely on their wireless devices to place 224,000 E-911 calls to police and emergency workers. More than 95 percent of Americans live in counties with a choice of at least three or more wireless carriers. All of this is a result of Congress' vision in the 1993 Act. But now, certain legislative and regulatory actions threaten

to limit the innovation and growth that have become hallmarks of the wireless industry. I would like to focus on one particular barrier—the increasing propensity of states to try to force wireless providers to modify their business procedures.

State Regulation of Wireless Services Is Harmful to Consumers and Competition

One of the primary means by which wireless providers compete to secure and retain subscribers is through the provision of excellent customer service. T-Mobile considers an informative pre-purchase experience, customer-friendly bills, and responsive customer service to be critical parts of its overall offerings and is proud to be a market leader in this regard. Another notable way in which T-Mobile has differentiated itself is by introducing the interactive “Personal Coverage Check” feature to our website, which enables customers to check the quality of network coverage where they live, work and travel before they purchase service. These branding efforts are the direct result of a competitive market that Congress encouraged by adopting a light-touch approach to the wireless industry.

In light of Congress’ decision to rely on market-based competition whenever possible to ensure the interests of wireless consumers are served, there is no justification for new, extensive regulatory intervention at this point in the industry’s development. While all industries encounter some growing pains—especially one that is growing as fast as wireless—we believe there is simply no evidence of any systemic wireless market failure. In this environment, new and intrusive regulation would inevitably create confusion in the marketplace, narrow competition among carriers, and drive up costs to consumers. The likely result would be *less* consumer satisfaction.

This is particularly the case when micromanagement is occurring on a state-by-state level. As Congress recognized when it enacted Section 332 of the Communications Act, wireless service is provided on a nationwide basis without regard to state boundaries. Notwithstanding the national nature of the wireless industry, some state commissions believe that they should each have the opportunity to dictate what a wireless bill should look like, how charges should be explained, and the precise language carriers must use when marketing their services. While the states contend that this intrusive oversight is necessary to protect consumers, it is not clear how 10, 20, or 50 different rules on a contract’s font size or disclosure language could possibly benefit anyone. To the contrary, divergent state requirements will result either in information overload to the consumer or permit the state with the most burdensome regime to effectively set policy for the entire country. It also would prevent companies like T-Mobile from distinguishing themselves in the marketplace through high-quality customer service and differentiated products.

For these reasons, we believe state-by-state regulation of wireless is not in the public interest, regardless of whether such regulation is aimed at rates and entry or the other terms and conditions of wireless offerings. We encourage Congress as it considers reforms to the Communications Act and exercises its oversight authority over the FCC to affirm that, in light of the highly competitive and nationwide nature of the wireless industry, a Federal regulatory framework should apply to wireless services.

Conclusion

For the reasons stated above, T-Mobile respectfully urges the Committee and Congress to ensure that the FCC hold to its June 29, 2006, auction date so that valuable spectrum reaches the marketplace for the continued deployment of advanced wireless services. In addition, in order to ensure that the wireless industry continues to be a competitive success story, we urge Congress to confirm that wireless carriers are to be regulated with a light touch and solely at the national level.

Thank you again for inviting me here today. I am happy to answer any questions.

The CHAIRMAN. Thank you very much. Our next witness is Jeannine Kenney, Senior Policy Analyst for the Consumers Union. Ms. Kenney?

STATEMENT OF JEANNINE KENNEY, SENIOR POLICY ANALYST, CONSUMERS UNION; ON BEHALF OF THE CONSUMERS UNION, CONSUMER FEDERATION OF AMERICA, AND FREE PRESS

Ms. KENNEY. Thank you, Mr. Chairman. The number of issues you have before you today is really daunting. I want to touch on

just a few of them, and we have addressed a number of them more extensively in our written statement.

Like Mr. Sugrue, we are very concerned about the concentration of spectrum, particularly among the dominant players. We hear a lot, and you hear a lot, about the competition in the wireless and cellular phone market and why we don't need regulation of that market. The number of competitors, however, belies the spectrum concentration issues, and it fails to tell the story of the battle for the bundle, that the dominant cellular providers are also the dominant wireline providers competing for the high value customer. We have significant concerns that the low value consumer, the low margin consumer, who needs a single service and can only afford that service, will be left behind. The recent announcement by AT&T certainly exacerbates these concerns. So spectrum reform in this environment becomes extremely important.

Having agreed with Mr. Sugrue, let me disagree with him about his concerns about over-regulation of the cellular market. We get tons of concerns—I hear a lot of concerns by consumers about their carriers. FCC gets tens of thousands and the states get hundreds of thousands of complaints. Cellular carriers rank below cable and HMOs in terms of consumer satisfaction. There has been widespread abuse in line items in cellular bills and certainly abuse on early termination fees, which are numerous. We would urge you to reject efforts to preempt the states in this area and allow the states to protect consumers in the way they have for years. Having raised some concerns about preemption, we don't necessarily think preemption is always inappropriate. To that end, we do support Senator Boxer and Senator Specter's bill on Wireless 411 Privacy. Because we have concerns about pre-emption, for the same reason we are not able, at this point, to support the Phone Records Privacy Bill the Committee will consider later this week, but do look forward to working with you on that.

In addition to our concerns about concentration in the wireless market, we are very concerned about concentration in the broadband market. You've heard a lot about that in your hearings this year. We have been looking for a wireless broadband competitor to compete with the dominant cable and DSL providers, and we haven't found one yet. That is why spectrum reform is so critical and I think the most important thing this Committee can do to enhance competition in broadband and bring it to those communities that don't have access to it. To that end, we strongly support the "white spaces" legislation, introduced by you, Mr. Chairman, and by Senator Allen. We think that legislation will open up significant space for low-cost affordable broadband to consumers who don't have access to it, create new opportunities for entrepreneurs to enter the marketplace and increase our broadband competitiveness in the world, where we have badly fallen behind. We would urge that, in tandem with the legislation on the "white spaces," the Committee move Senator McCain and Lautenberg's legislation on community broadband. Wireless technologies provide many new low cost opportunities for communities to serve their residents. We are very concerned that attempts to pre-empt localities from offering community wireless services will impede the promise of the "white space" legislation.

Finally, in terms of spectrum reform generally, obviously making available the reclaimed spectrum after the digital transition creates a lot of new opportunities for consumers. We really look to the option of spectrum in the 700 band as an opportunity to increase wireless broadband competition by bringing in a new third competitor to the dominant wireline providers. However, we think Congress will need to act to make sure that happens. We would be very concerned if spectrum went to the dominant wireline providers, Cingular and Verizon, and would like to see them precluded from bidding on the auctions. We want to see that new market entrants and smaller players have opportunities to bid for that spectrum as well. Some reform to the designated entities program is necessary to ensure that the large, regioned wireless carriers can't partner with the small companies who are eligible for those bidding credits. That will help ensure that we have some new players in the marketplace.

Finally, we are concerned about the size of the spectrum blocks auctioned. We support Senator Snowe's legislation to ensure that smaller blocks are made available for bidding, so that rural areas are not left behind in wireless service and broadband service.

Thank you very much. It has been a pleasure to be here. I look forward to your questions.

[The prepared statement of Ms. Kenney follows:]

PREPARED STATEMENT OF JEANNINE KENNEY, SENIOR POLICY ANALYST, CONSUMERS UNION; ON BEHALF OF THE CONSUMERS UNION, CONSUMER FEDERATION OF AMERICA, AND FREE PRESS

Summary

Consumers Union,¹ Consumer Federation of America,² and Free Press³ appreciate the opportunity to testify on wireless communications issues and spectrum reform. In light of the recently announced acquisition of BellSouth by AT&T, critical questions of market competition and consumer protection are more important than ever.

If the merger is approved, AT&T will have sole control over Cingular Wireless, the largest cellular carrier in the Nation that leads all others not just in market dominance, but also in customer dissatisfaction and complaints. AT&T will become far and away the largest provider of phone service and DSL, dominating the market for bundled services in local, long distance and wireless services within its 22-state market stretching coast to coast. As the new company rolls out its multi-channel video service, its market power will dwarf even the largest cable companies. An integrated voice, video, broadband and wireless provider with such sweeping market control will have little incentive to discipline prices or tolerate competition. And competitors unable to offer the full bundle of services within AT&T's region will have even less incentive and ability to compete for the lower-volume, lower margin customers unable or unwilling to buy the bundle.

¹ Consumers Union is a nonprofit membership organization chartered in 1936 under the laws of the State of New York to provide consumers with information, education and counsel about goods, services, health and personal finance, and to initiate and cooperate with individual and group efforts to maintain and enhance the quality of life for consumers. Consumers Union's income is solely derived from the sale of *Consumer Reports*, its other publications and from non-commercial contributions, grants and fees. In addition to reports on Consumers Union's own product testing, *Consumer Reports* with more than 5 million paid circulation, regularly, carries articles on health, product safety, marketplace economics and legislative, judicial and regulatory actions which affect consumer welfare. Consumers Union's publications carry no advertising and receive no commercial support.

² The Consumer Federation of America is the Nation's largest consumer advocacy group, composed of over 280 state and local affiliates representing consumer, senior, citizen, low-income, labor, farm, public power and cooperative organizations, with more than 50 million individual members.

³ Free Press is a national nonpartisan organization with over 200,000 members working to increase informed public participation in crucial media policy debates.

The centrality of Cingular to this merger demands full Congressional scrutiny of increasing signs that wireless consolidation is solidifying regional dominance, and leading toward, at best, a duopoly that will undermine robust competition and inflate prices, leaving low and moderate income consumers and underserved communities facing enormous barriers to participation in our digital economy. As concentration in wireless phone service has increased, competition in broadband is, and will remain, moribund without Congressional action. Last year's announcement that the newly merged Sprint/Nextel will partner with large cable providers have deflated hopes that the company would emerge as a broadband competitor to DSL and cable modem. And with the Federal Communications Commission's decision to allow cable and telephone companies to exclude broadband competitors from their wires, most consumers are left with, at best, just those two broadband providers. As a result, wireless broadband provided by new market players unaffiliated with dominant phone and cable companies now offers the only meaningful hope for competition in the broadband marketplace.

In this environment, spectrum policy becomes increasingly important in ensuring that new competitors to dominant broadband and wireless phone providers emerge and that broadband becomes available to those who don't have access to it or can't afford it. Advances in technology provide the Committee with new opportunities to make currently unused spectrum within the broadcast band newly available to wireless broadband competitors for unlicensed use.

In virtually every market in the Nation, between 20 percent and 80 percent of allocated television channels are unlicensed and unused. They are ripe for transition to broadband technologies and will be essential in expanding the availability and affordability of broadband. Today, the inadequate volume and quality of existing unlicensed spectrum is a significant barrier to expansion of wireless broadband services. With more and better quality unlicensed spectrum, new opportunities emerge for vigorous competition in wireless broadband; for communities to offer affordable broadband service where it has never before been available; and to spur the emergence of wireless broadband as a true competitor to dominant wireline broadband providers. But to ensure that unlicensed spectrum will maximize broadband access for underserved rural and urban consumers, Congress must clarify and protect the rights of localities to offer broadband service.

Additionally, the reclamation and auction of spectrum in the 700MHz band provides Congress with a new opportunity to enhance competition in wireless phone and broadband. How and to whom spectrum in that band is auctioned will determine whether new competition in broadband and wireless phone service emerges or whether the market position of already dominant wireless providers is solidified. To ensure that wireless broadband emerges as a competitor to cable modem and DSL, it will be critical that at least some spectrum licenses go to providers unaffiliated with wireline broadband providers, preferably new market entrants and smaller market players.

Finally, as concentration in wireless has increased and consumer complaints have grown, the wireless industry has attempted to erode states' authority to protect consumers from carriers' deceptive and misleading billing practices; unreasonable, unfair, and anticompetitive contract terms; and inadequate privacy safeguards for customer calling records. States have been the first line of defense for telecommunications consumers, particularly in complaint-ridden cellular services. They've identified and taken action against carrier practices that harm wireless consumers. The Federal Communications Commission is ill-positioned to resolve the hundreds of thousands of telecommunications complaints that states receive each year. Congress must either enact strong, enforceable Federal consumer protection and privacy laws or protect the ability of the states to safeguard consumers.

As the Committee considers the wireless and spectrum policy issues before it, we offer the following recommendations:

- Provide careful oversight of the proposed AT&T acquisition of BellSouth, particularly with respect to competition in wireless phone service, and urge the Department of Justice and Federal Communications Commission to reject the merger unless wireless assets are divested to ensure head-to-head competition between Cingular Wireless and the wireline company. Urge DOJ and FCC to impose permanent network neutrality conditions to prevent AT&T from discriminating against users and competitors on Internet services.
- Require that, at a minimum, a portion of the spectrum within the 700 MHz band is reserved for new market entrants and designated entities, and that dominant market players Cingular and Verizon are precluded from bidding on licenses in markets where they own significant amounts of spectrum.

- Report and seek final enactment of legislation comparable to S. 2332, the American Broadband for Communities Act sponsored by Senator Stevens, and S. 2327, the Wireless Innovation Act, sponsored by Senator Allen and cosponsored by other Committee Members. We strongly support both bills. Each would make new unlicensed spectrum available in the unoccupied channels of the broadcast band while protecting existing broadcasters operating within that band from interference. Action in this area is among the most meaningful the Congress may take to foster development of, competition in, and affordable access to wireless broadband services.
- Report and seek final enactment of S. 1294, the Community Broadband Act introduced by Senators McCain and Lautenberg, to ensure that communities and the entrepreneurs with whom they partner can take advantage of low-cost, affordable technologies to offer new, innovative and affordable wireless broadband services to local residents.
- Report and seek final enactment of S. 1350, the Wireless 411 Privacy Act, which we strongly support, to ensure that any wireless phone directory that may be created does not trench upon consumers' right to keep their cell phone numbers private or result in higher costs to consumers from unwanted incoming calls.
- Report and seek final enactment of legislation prohibiting fraudulent practices used to obtain consumers' detailed and private cell, landline or VoIP phone records; imposing tough penalties on those who engage in fraudulent practices; requiring tough new Federal standards for telephone companies' internal safeguards for consumer phone records; and requiring such providers to seek affirmative consent before private calling records are shared. Regretfully, Consumers Union cannot support the Protecting Consumer Phone Records Act because it preempts the states' ability to require compliance with tough consumer phone records privacy requirements, while providing no guarantee that Federal phone record privacy protections will be strengthened. We look forward to working with the Committee to strengthen the legislation.
- Clarify and confirm the role of the states in regulating terms and conditions for wireless phone services as provided under Section 332 of the Communications Act of 1934, and reject wireless carriers' attempts to undermine the strong consumer protections against anticompetitive, predatory and unfair practices by wireless carriers.
- Urge FCC to reject the pending wireless industry petition to preempt state regulation of early termination fees and to reconsider its 2005 Order preempting states from regulating line-item billing abuses.

Declining Competition in Wireless Services

Declining Competition in Wireless Telephone Services

If AT&T's acquisition of BellSouth is approved, and we urge that it not be, AT&T will be the dominant provider of both wireless and wireline services in its enlarged 22 state region with complete control over Cingular, giving it unprecedented ability to foreclose competition not just in bundled services, but also in single components of that bundle.

Today, competition in telecommunications markets is focused largely on selling bundles of video, voice (wireline and wireless) and Internet services to the high-end, high margin customer who can afford it. Sprint/Nextel's announcement last year that it will enter into a joint venture with several cable operators underscores this point. To compete with Cingular and Verizon Wireless in the AT&T and Verizon territories, Sprint/Nextel needs the additional service components of cable—video and cable modem. And cable needs a wireless service. The joint venture reflects market realities that wireless competitors lacking other bundle components faced significant market disadvantages even before the announced AT&T/BellSouth merger.

In the face of AT&T's bundled offerings and enhanced market power, it will be increasingly difficult for single or dual service telecommunications providers to compete on smaller bundles or individual products, including wireless, giving AT&T the power to undermine single-service competitors or relegate them to niche markets. Moreover, the few companies offering bundled services within their own territories will have little incentive to invest in and aggressively market cellular and long distance to low-volume, low-margin customers within AT&T's market. As a result, over time, it is realistic to expect inflated prices for low-volume, single-service cellular plans.

In fact, since the most recent wave of wireless mergers, the dominant carriers have substantially increased the baseline price for low-volume cell-phone usage plans, forcing consumers to pay substantially more before they could receive many

of the new features the companies are offering. For example, Cingular's entry-level plan has shot up from about \$30 to almost \$40 per month in the last two years. Verizon is also charging about \$40 a month for a similar entry-level plan—up about 15 percent over the last two years. Clearly, as these carriers become more dominant in their wireline core territories, they've been able to raise prices for low-volume cell phone users, reversing the trend of cellular service becoming more competitive with unlimited-usage, basic local telephone service, which usually costs about \$20 per month.

As cable enters the voice market with Internet telephony, at best two competitors emerge: the dominant cable provider and the dominant Bell. While the consolidation of AT&T with BellSouth strengthens AT&T's ability to compete with cable, consumers well know that competition between two competitors is not enough. Moreover, any aggressive competition that emerges among the two providers will likely be confined to the bundle, leaving the lower income consumer paying inflated prices providers charge for unbundled service components.

The end result is likely to be that the consumer at the bottom end of the market will be faced with few choices and the prospect of inflated rates. Wireless is not yet a true substitute for wireline phone service, leaving predictions that consumers unhappy with their wireline carrier can simply dump their landline in favor of wireless. Even the lowest cost cellular services exceed prices for local wireline service, with the exception of still-niche prepaid wireless plans that account for only a fraction of the market. Therefore, for wireless to function as a competitor to wireline, rates for the lowest cost, unbundled wireless plans must fall much more. With the merger consolidating AT&T's position and the best case scenario of duopoly competition, that becomes far less likely to occur.

Whether VoIP can become a meaningful competitor in local service and have some price policing effect on wireless depends entirely on whether Congress adopts meaningful and enforceable network neutrality legislation. BellSouth, AT&T, and Verizon have unblushingly stated their intention to impose access fees on VoIP providers and other content and service providers. In addition to their unfettered ability to block or impede data transmission for VoIP calls, their control over broadband networks and ability to charge access fees gives network owners like AT&T the ability to impose costs on VoIP that ensure it cannot compete with local or long distance.

At best, consumers within AT&T's territory will have two choices for bundled packages of services: AT&T and the dominant cable monopoly. A choice between two dominant providers intent in competing only on bundles rather than single service offerings is simply not enough to protect the so-called "low-value" consumer who needs or can afford just one or two services. And whether cable will even serve as an effective competitor in bundled services depends upon how aggressively it enters the telephone market, and upon the terms of its agreement with Sprint Nextel to offer wireless services in its package of offerings.

Declining Competition in Broadband

Today, the United States ranks 16th in the world for broadband penetration per capita. Even as other technology markets are exploding in growth and innovation, the cost and speed of broadband has remained relatively constant for years. While American consumers are asked to settle for the FCC's broadband standard of 200 kbps, companies in Japan, South Korea, and most of Western Europe are selling connections 100 times faster for similar prices. The digital divide in global broadband competitiveness is a slow-motion disaster for our long term economic prospects.

This Nation's shortcomings in broadband deployment is explained, in large part, by the lack of competition in the broadband market, the absence of a national broadband policy, and the disincentives for the duopoly of network giants to invest in higher capacity service. Cable and DSL providers control almost 98 percent of the residential and small-business broadband market. And about a quarter of the U.S. has access to either cable modem or DSL, but not both. Meanwhile, the FCC's own data shows that satellite and wireless broadband continue to lose market share, demonstrating that intermodal competition is virtually nonexistent in broadband.

Though the total number of connections has increased, the percentage of U.S. households with no access to broadband has remained constant at 19 percent. Broadband penetration rates in urban areas are substantially higher than for rural areas where some 30 percent of consumers have only one source of broadband: satellite, which is slow and expensive. The urban/rural digital divide is not closing—it is widening. According to a recent Pew study, urban penetration rates are 39 percent compared to 24 percent for rural areas. In 2004, the gap was 29 percent to 16 percent. In 2002, it was 18 percent to 6 percent.

Reports of a broadband price war are misguided. Analysis of “low-priced” introductory offers by companies like SBC and Comcast, in an August 2005 joint report by Free Press, Consumers Union, and Consumer Federation of America, reveal that these are little more than gimmicks designed to capture market share. At the end of the introductory period, usually pursuant to a long-term contract, rates rise significantly. Moreover, the so-called “price war” boils down to offering half the speed at half the price from comparable offers two years ago.

Consumers need, at a minimum, a third competitive option—wireless broadband that is less expensive and which doesn’t depend on DSL or cable modems. It offers the best and perhaps now the only way to close the digital divide and enhance competition, particularly in light of FCC’s decision to reclassify cable and DSL as information services, foreclosing competition from other providers through leased access. Further, we need to promote market conditions that enhance the development of WiMax and other new wireless technologies as low-cost infrastructure alternatives for last-mile service delivery. 21st Century broadband policy must anticipate a future when digital networks are hybrids of wireless and wireline facilities with robust intermodal competition.

To date, meaningful competition in broadband from wireless carriers has not emerged, and promises that mergers among wireless carriers might bring it have fallen flat. Among the benefits that FCC cited in its 2005 Order approving the Sprint Nextel merger was entry of another competitor to DSL and cable modem in the fixed broadband market. Yet just months after the merger was approved, Sprint Nextel announced a joint venture with four cable partners—Comcast, Cox Communications, Time Warner Cable and Advance/Newhouse Communications—to offer a bundle of voice, video, high-speed data and wireless telephone services. Sprint Nextel’s Chief Operating Officer said the company would not compete directly against its cable company partners and hoped to further expand its partnership to other large cable operators Cablevision and Charter Communications. The venture merely solidifies the cable modem/DSL broadband duopoly. This development also demonstrates the difficulty of generating head-to-head competition in a marketplace where leading providers seek not to compete on individual services but instead on the bundle. It is wishful thinking to believe that a wireless carrier owned by a wireline company will offer consumer broadband service to compete with DSL and cable. Therefore consumers seeking affordable, unbundled broadband services must look to other means for affordable, ubiquitous broadband.

The Competitive Potential of Wireless Broadband Using Unlicensed Spectrum

Wireless broadband using unlicensed spectrum offers a new opportunity to provide affordable broadband to rural and other underserved areas. But, equally important, wireless broadband can offer an affordable competitive alternative to areas that have access only to a single high-priced, monopoly provider. Wireless broadband providers currently operate in a vigorously competitive marketplace—unlike their wireline cousins. But wireless services currently rely on a limited band of unlicensed, or open-market, spectrum in the 2.4 and 5.0 GHz bands, long dubbed the “junk bands.”

Broadband is offered today by thousands of Wireless Internet Service Providers (WISPs) using unlicensed spectrum. Wireless broadband is already an economic generator for thousands of small and midsized businesses that provide “hot spots” in places where people gather, like coffee shops, conference centers and airports. But companies, communities and non-profits are also using wireless broadband to connect parks, neighborhoods, and even entire cities and towns. To date, over 300 communities ranging in size from tiny rural villages to major metropolitan areas have put wireless broadband to good use—offering affordable broadband to local households, often for the first time. With off-the-shelf affordable technology, communities, working in partnership with entrepreneurs, are creating high-speed wireless networks at a fraction of the cost of wired facilities. WiFi has been deployed in densely populated urban areas and sparsely populated rural areas.

But the growth potential of this industry is limited because under current licensing schemes, unlicensed wireless broadband is limited to the high-frequency junk bands. This, though well-suited to carry a high volume of data, does not easily permit signals to penetrate through obstacles, such as trees or walls. Moreover, the bands are also extremely crowded; unlicensed wireless broadband transmitters share this spectrum with other consumer electronic devices.

In order for wireless broadband to become an option for more Americans, providers need access to unlicensed low-frequency spectrum below 1 GHz—less crowded spectrum with propagation characteristics that allow signals to travel through buildings, trees and other obstacles. Lower frequency spectrum will allow wireless

broadband networks to reduce the number of transmitters necessary to cover a square mile. The cost savings will be passed on in the form of lower consumer prices. Not only will this open the market for new services and new entrants, it will open the public airwaves for further innovation. If the history of high-frequency WiFi is any indicator, the emergence of low-frequency wireless broadband will become an explosive economic engine.

Unlicensed Spectrum in the TV White Spaces—The Means to Affordable Broadband & Renewed Competitive Opportunities

Among the most important priorities for broadband policy is finding low-frequency spectrum to make available for unlicensed use. To enhance broadband access to those who lack it and increase broadband competition where it is currently limited, the Committee should approve legislation to open unoccupied broadcast channels—or white spaces—for unlicensed, non-interfering uses. Consumers Union therefore strongly endorses S. 2332, the American Broadband for Communities Act sponsored by Chairman Stevens, and S. 2327, the Wireless Innovation Act, sponsored by Senator Allen and cosponsored by other Committee Members. Moving these bills forward is among the most meaningful action Congress could take to foster development of, competition in, and affordable access to wireless broadband services.

Both bills make available unused broadcast spectrum below 698 MHz for use by unlicensed devices, and call on the FCC to complete a proceeding it began more than two years ago. FCC's proceeding would establish technical and device rules to facilitate use of white spaces by unlicensed devices, while providing for strict protections against interference with television signals. Despite a flood of support from industry groups, engineers and the public interest community, this FCC proceeding has stalled. It is time for Congress to step in by enacting white spaces legislation.

Vacant TV channels are perfectly suited for wireless broadband and other unlicensed wireless Internet services. Signals can travel far and pass through dense objects and topographical barriers. And greater access to vacant TV channels would facilitate a market for low-cost, high capacity and mobile wireless broadband networks. Using these white spaces, the wireless broadband industry could deliver Internet access to every American household at high speeds and low prices—for as little as \$10 a month by some estimates. At a time when more than 60 percent of the country does not subscribe to broadband either because it is unavailable or unaffordable, this would represent an enormous social benefit and a catalyzing economic engine, particularly in rural areas.

According to a November 2005 analysis by Free Press and the New America Foundation, *“Measuring the TV ‘White Space’ Available for Unlicensed Wireless Broadband,”* virtually every market in the country has unoccupied broadcast channels allocated for television broadcasting but not actually in use. The study found that rural areas, which suffer most from lack of broadband access, have the greatest amount of available white space. Yet even in urban areas, substantial white spaces are also available. The following summarizes the percentage of the digital broadcast spectrum the study found would remain unused even after the digital transition, in select markets:

- Juneau area—74 percent
- Honolulu area—62 percent
- Phoenix area—44 percent
- Charleston area—72 percent
- Helena area—62 percent
- Boston area—38 percent
- Jackson area—60 percent
- Fargo area—82 percent
- The Dallas-Ft. Worth area—40 percent
- San Francisco area—37 percent
- Portland area—66 percent
- Tallahassee area—62 percent
- Portland area—58 percent
- Seattle area—52 percent
- Las Vegas—52 percent
- Trenton area—30 percent
- Richmond area—64 percent
- Omaha area—52 percent
- Manchester area—46 percent
- Little Rock area—60 percent
- Columbia area—70 percent
- Baton Rouge area—44 percent

We applaud Chairman Stevens and Senator Allen for their leadership in working to make more and better spectrum available for wireless broadband and other innovations yet to come. We look forward to working with Members of the Committee toward enactment of this important legislation.

Protecting the Rights of Communities to Offer Wireless Broadband Systems

State laws preventing or deterring communities from providing wireless and other broadband services is additional roadblock to broadband roll out—a deterrent that dominant carriers have sought to erect even as they deny service to many small towns, villages and rural areas. More than a dozen states have laws on the books that prohibit or restrict the ability of a local government to offer broadband to its citizens, either as a public provider or (as in the majority of cases) as a partner with a private sector provider. In the last 18 months, fourteen states have attempted to enact or expand such restrictive statutes. In states without such laws, community broadband has been a critical force in the telecommunications market, bringing service to rural and low-income consumers, attracting business, and narrowing the digital divide.

Congress must ensure that communities cannot be preempted from launching their own community broadband networks. We therefore strongly endorse S. 1294, the Community Broadband Act, introduced by Senators McCain and Lautenberg, to ensure that communities and the entrepreneurs with whom they partner can take advantage of low-cost, affordable technologies to offer new, innovative and affordable wireless broadband services to local residents.

Spectrum Auction Policy—Making Room for New Entrants and Smaller Players

Congress also has the unique and important opportunity to ensure that reclaimed spectrum in the 700 MHz band will be used to facilitate robust competition in both the broadband and wireless telephone market. It should be no surprise that as wireless phone carriers have merged, ownership of spectrum has been concentrated in the hands of a few dominant market players. Even after the Department of Justice required AT&T Wireless to divest some of its spectrum assets as a condition of its merger with Cingular, Cingular still retains ownership of up to 70 of 189 MHz available in some markets. In many others, it controls one-third of the available spectrum.

Congress should put a stop to consolidation of spectrum ownership by ensuring that at least a portion of the reclaimed spectrum will be allocated for smaller existing players and new market entrants who may offer new competitive opportunities across a range of wireless services. In addition, major players Cingular and Verizon, in which spectrum ownership is already highly concentrated, should be precluded from bidding on spectrum in key markets. If large, already dominant telecommunications providers are the only entities that can successfully bid on spectrum licenses in the valuable 700 MHz band, the risk of foreclosing enhanced competition in both wireless phone and broadband service is great. Large market players already offering wired broadband services are unlikely to use new spectrum to offer affordable wireless Internet services that compete with their wired offerings. They're more likely to use new spectrum to expand existing wireless service offerings to high-value consumers rather than provide new, affordable services to average consumers. The battle for the bundle, and only the bundle, will continue.

In addition, Consumers Union has recommended in recent comments to FCC, that small, minority and women-owned businesses have meaningful access to spectrum licenses during its upcoming 2006 wireless auctions. To do so, the Commission must enhance the effectiveness of its "designated entity" (DE) program by preventing "large, in-region wireless carriers," from partnering with DEs in order to access additional spectrum. A designated entity is a small business that is eligible for an auction bidding credit in order to allow it to compete in a spectrum auction. We also urged the Commission to conduct additional study regarding ways to further improve access to spectrum licenses for small businesses, particularly minority and women-owned businesses, in order to decrease barriers to market entry and pass along the benefits of competition and access to consumers.

Consumer Protection in Wireless Services

State Preemption: Unfair Contract Terms & Deceptive Billing Practices

In light of growing concentration in wireless telephone markets, we are increasingly concerned about efforts to preempt state regulatory authority over terms and conditions of cellular service. Under Section 332 of the Communications Act of 1934, states retain regulatory authority over cellular carriers, preempted only from regulating market entry and rates, with regulation of terms and conditions expressively

reserved for them. Under this authority, states have aggressively sought to regulate and take other action against deceptive, misleading and anti-consumer practices of the cellular industry.

Through court challenges, petitions to the Federal Communications Commission and appeals to Congress, carriers have sought, in some cases, successfully, to erode this vital and distinct role for state regulation of wireless carriers. Last year, the FCC preempted state regulation of line-item bill abuses—a decision currently under appeal in the 11th Circuit. And a cellular industry petition pending at the FCC seeks preemption of state efforts, including generally applicable laws, to curb coercive, anti-competitive early termination fees. If successful, these preemption efforts will badly erode the consumer gains made by states regulating deceptive and misleading carrier tactics.

Low consumer satisfaction with their carriers, growing numbers of consumer complaints about cellular bills and service, and the substantial, artificial barriers that prevent consumers from switching carriers, belie the cellular industry's argument that competition in wireless renders regulation unnecessary. Last year, the Federal Communications Commission received more than 25,000 complaints about wireless service. While down slightly from 2004, the number remains disturbingly high. The complaints FCC receives are just a fraction of the hundreds of thousands handled by the states. And even those underreport consumer dissatisfaction. A 2003 study by AARP found that nearly half of all cell phone users (46 percent) reported not knowing whom to contact in case their cell phone provider could not resolve a billing or service problem to their satisfaction. Only four percent cited the Federal Communication Commission (FCC) as a potential contact, and 18 percent said they would not contact anyone but their provider.

Consumers Reports' recent and largest-ever annual survey of 50,000 cell phone users across 18 major metropolitan markets found that consumers rank cell phone carriers below HMOs and digital cable service in terms of overall satisfaction. Only 47 percent of our respondents said they were either completely or very satisfied with their service—a low showing for any service. And notably, consumers ranked the Nation's largest carrier, Cingular, either lowest or second lowest among all carriers in every market surveyed. It received consistently low marks in handling customer questions and complaints. That finding tracks FCC's own complaint data. In 2004, the complaint rate for AT&T & Cingular Wireless was nearly four times the rate for Verizon Wireless. Meanwhile, some smaller regional carriers Alltel and U.S. Cellular had some of the lowest complaint rates.

Billing complaints, including questionable line items, top the types of complaints received by regulators. Consumers pay inflated prices when line-items not included in the advertised cost of the package are added to their bill. A 2004 NASUCA petition asked FCC to prohibit the nearly ubiquitous carrier practice of including line-items purportedly to recover "regulatory" fees or charges where none have been authorized or imposed by government. In denying NASUCA's petition last year, the Commission simultaneously classified regulation of line-items as rate regulation, fully preempting the states from protecting their consumers.

Early termination fees (ETF)—penalties for switching carriers mid-contract—range from \$150 to \$240 *per phone* and are almost never pro-rated by the elapsed contract period. Contract terms often extend beyond the one or two years from the original agreement, because the contract length is usually extended when consumers upgrade their plan or buy a new phone. Early termination penalties erect enormous financial disincentives for consumers to switch carriers, even if they are unhappy with the current carrier's service, quality or price or could get a better deal elsewhere. A 2005 survey by the U.S. Public Information Research Group found that 36 percent of respondents said early termination fees had prevented them from switching carriers and that nearly half of all cell phone customers would switch if early termination fees were eliminated. Consumer Reports' 2005 survey found comparable results: half of consumers who wanted to switch said they wouldn't because of their long-term contracts. Elimination of non-prorated early termination fees would promote greater competition, improve quality and enhance customer service.

Federal preemption of state authority over cellular carriers would leave consumers without redress and protection. FCC is ill equipped to handle the thousands of consumer complaints it receives, let alone resolve them. Congress should urge the FCC to reconsider its 2005 decision preempting state authority over line-item billing abuses by cell phone providers and urge its rejection of the wireless industry petition to prohibit state regulation of early termination fees.

Protecting Private Calling Records

In recent months, widespread media attention about the ease with which one's private and detailed calling records may be obtained and how widely carriers may

share those records with other businesses has only intensified consumer demand for privacy protections.

We applaud the leadership of Chairman Stevens, Co-Chair Inouye, Senator Allen and Members of this Committee who have worked to address consumer concerns about carrier breaches of private phone records. And while we respect the Committee's effort to craft a solution to the problem of phone records privacy breaches, we cannot support S. 2389, the Protecting Consumer Phone Records Act, as introduced, due to our strong concerns about its preemption provisions. While we support provisions prohibiting pretexting and authorizing new penalties against bad actors, the bill's broad preemption provision clearly represents a step backward in consumer privacy protections. The bill fails to mandate new Federal regulations requiring carriers to safeguard consumer proprietary network information or give consumers the right to opt-in before CPNI is shared, while simultaneously preempting states from taking either action.

Many states already have enhanced privacy protections for consumer phone records. For example, California requires opt-in consent prior to sharing of CPNI. Arizona is about to implement new regulations, several years in the making, that will require carriers to confirm their subscribers' intent to allow their CPNI to be shared with others. Other states are working to improve phone record privacy protections. Illinois Governor Blagojevich recently announced his intention to propose legislation to require carriers to implement tougher privacy safeguards. S. 2389 would preempt all of these efforts and others currently contemplated without putting in their place meaningful Federal privacy protections.

We look forward to working with the Committee to strengthen the bill and suggest the following additional provisions:

First, in addition to enhanced penalties and explicit prohibitions on pretexting, Congress should require that the Federal Communications Commission prescribe regulations requiring carriers and VoIP providers to maintain stringent internal technical, physical and administrative safeguards to help ensure that phone companies diligently protect the security of their customers' phone records. Consumers have entrusted their most private calling information to their carriers who have a duty to closely guard them. That the safeguards phone companies currently have in place are inadequate to protect consumers' privacy is demonstrated by the explosion in the unscrupulous businesses that offer to sell phone records.

Second, Congress should require that all carriers receive affirmative consent prior to sharing their customers' proprietary network information (CPNI) with joint venture partners, contractors or others. Carriers have a first obligation to their customers, not their business partners. CPNI includes, among other things, customers' most private calling activities including who they called, when they called them and how long they talked. Prior to a decision by the United States Court of Appeals for the Tenth Circuit, the Federal Communications Commission required that consumers provide affirmative "opt-in" consent before their CPNI could be shared. FCC Chairman Kevin Martin noted in his testimony to the House Energy and Commerce Committee earlier this year that the shift from opt-in to opt-out consent has resulted in much broader dissemination of consumer phone records and may have contributed to the proliferation of online businesses offering to sell consumer phone records.

We look forward to working with the Committee to strengthen the privacy protections in S. 2389 by including these key provisions or eliminating the Federal preemption of state phone records privacy laws.

Wireless 411—Protecting the Privacy of Cell Phone Numbers

The privacy of consumer's cell phone numbers and calling records has rightfully gained significant attention in recent years. The cellular industry's interest in creating a wireless phone directory provoked widespread consumer concern when it was first contemplated several years ago. And although plans for such a directory may have temporarily stalled, consumer concern about the privacy of phone numbers has not.

We therefore support S. 1350, The Wireless 411 Privacy Act, introduced by Senators Specter and Boxer. The legislation would give consumers greater control over whether and with whom their cell phone number is shared. That approach stands in stark contrast to the near absence of control consumers have over the sharing of far more detailed CPNI.

Consumers view cell phones as more private than landline phones. When their cell phone rings, they expect that the person on the other end to be someone to whom they personally gave their phone number. Because most cell phone customers pay for their incoming calls, consumer control over their number should be viewed through the lens of both privacy and out-of-pocket costs.

The legislation will help ensure that the more than 180 million cell phone customers in the U.S. have control over how and when—or even if—their cell phone numbers are included in any directory of cell phone numbers. It is imperative that Congress codify privacy protections for cell phone consumers so that all consumers, in particular those who wish to remain unlisted, will be protected. It is not adequate to merely rely on industry promises to protect privacy, since such voluntary protections could easily disappear in the future. Moreover, carriers have a strong financial incentive to ensure that as many subscribers as possible are listed in the directory; it has been estimated that a directory would cost as much as \$2 billion per year through directory assistance charges and additional usage minutes by 2008.

Importantly, the bill ensures that carriers receive affirmative opt-in consent before any subscriber is listed in a wireless 411 directory. Experience tells us that opt-out consent is entirely inadequate in protecting consumers. When the wireless directory was contemplated, several carriers began securing opt-out “permission” by inserting language in wireless phone contracts allowing the carrier to include the cell phone number in a directory and, in some cases, charge fees to consumers if they choose to have their name removed.

The “Wireless 411 Privacy Act” is a common-sense solution that allows the wireless industry to develop a new business while still respecting the privacy wireless consumers have expected for more than 20 years. It provides consumers a means to control their cell phone bills by remaining unlisted, thereby limiting exposure to uninvited calls.

Conclusion

We appreciate the opportunity to present our views on the many critical questions of wireless market competition and consumer protection and look forward to working with Congress to ensure that all consumers have access to the benefits of the digital age.

The CHAIRMAN. Thank you very much. Our last witness is Lawrence White, Co-Chair of the Spectrum Policy Working Group. This was the Digital Age Communications Act Project. We thank you for the booklet you have given us. We are pleased to have your comments.

STATEMENT OF LAWRENCE J. WHITE, CO-CHAIR, SPECTRUM POLICY WORKING GROUP, THE DIGITAL AGE COMMUNICATIONS ACT (DACA) PROJECT, PROGRESS & FREEDOM FOUNDATION (PFF); PROFESSOR OF ECONOMICS, STERN SCHOOL OF BUSINESS, NEW YORK UNIVERSITY

Mr. WHITE. Thank you, Mr. Chairman. My name is Lawrence J. White. I am a Professor of Economics at the NYU Stern School of Business. As you just indicated, I am Co-Chair, along with Dr. Thomas M. Leonard, of a Working Group that has been convened by the Progress & Freedom Foundation to propose a new spectrum policy for the United States. This Working Group is part of the PFF’s multi-faceted effort to provide a “Digital Age Communications Act,” which has now come to be called DACA, that would guide the reform of U.S. telecommunications policy. Our Working Group, just last week, unveiled its “Release 1.0” of its New Spectrum Policy Report, which I would like to submit for the record of this hearing. I request that the “Release 1.0” be entered in the record.*

In my written testimony, I try to summarize the basic thrust of that report. In my oral comments, I will have to summarize my summary. Basically, the report urges policymakers to fundamentally rethink spectrum management policy. As I indicated on the first page of my written testimony, the current system of command-

*The information referred to has been retained in Committee files.

and-control regulation and licensing of the electromagnetic spectrum has yielded and will continue to yield large and growing inefficiencies in spectrum use. A propertization of the spectrum, a system that would rely primarily on a framework of fully developed property rights and markets in spectrum, would yield great benefits for the U.S. economy.

Now, as you have heard from a number of speakers, the basic problem in spectrum is interference: one party's transmissions interfering with another. There are three basic ways of dealing with interference: First is the traditional FCC, command-and-control and licensing approach, with very detailed specification of geographic areas, frequency bands, service parameters, and specific uses and then the selection of specific parties through what used to be called "beauty contests" to serve those geographic areas in those frequency bands with those service parameters and those particular uses. This approach is now widely recognized as inefficient and discouraging innovation and discouraging competition. Indeed, you heard a little bit from JayEtta Hecker earlier today about those problems.

A second approach, which also has been discussed today, is the "Commons or Unlicensed" approach, and it has had some successes. When you look closely at it, it really comes down to another version of command-and-control regulation, where some entity has to be specifying power limits and has to be specifying protocols, so as to deal with interference.

There is a third approach, however, and that is one of propertization—of the creation of explicit property rights in spectrum and the reliance on markets to allocate spectrum to its most efficient uses. This idea was first proposed by Nobel Prize winner Ronald Coase in 1959. This is the approach that the report endorses.

In essence, the propertization system would create a system of property rights. Think in terms of a geographic area with boundaries and a spectrum frequency band with boundaries, and the owner of this spectrum "plot" would have the ability to transmit within that geographic area, within that frequency band, so long as that party did not exceed power limits at the geographic border and at the frequency band border. Also, because of the special physics of the spectrum there would need to be inband limits. Within those parameters, the party could do anything that he or she wanted with the spectrum, so long as he or she did not in essence trespass on his or her neighbors and so long as the antitrust laws are also observed in terms of agglomerations of spectrum. In essence, think real estate. This is the way spectrum plots could develop.

The real issue is how do we get from here to there: from the current command-and-control system to a propertized and market system. The report lays out five options for getting from here to there. We endorse three of those options. We also have some strong suggestions as to how to encourage greater efficiency in governmental holdings of spectrum, along the lines of some that were suggested by Mr. Kneuer earlier today.

In summary, the report urges policymakers to think creatively and in essence to think in terms of propertization and markets as the direction for spectrum policy reform.

I would be very happy to answer questions. Thank you very much, Mr. Chairman.

[The prepared statement of Mr. White follows:]

PREPARED STATEMENT OF LAWRENCE J. WHITE, CO-CHAIR, SPECTRUM POLICY WORKING GROUP, THE DIGITAL AGE COMMUNICATIONS ACT (DACA) PROJECT, PROGRESS & FREEDOM FOUNDATION (PFF); PROFESSOR OF ECONOMICS, STERN SCHOOL OF BUSINESS, NEW YORK UNIVERSITY

I am pleased and honored to have this opportunity to appear before this Committee on the important topic of today's hearing: "Spectrum Management Reform". Spectrum management reform is an area that, if policy moves in a sensible direction, could yield great benefits for the U.S. economy.

I am currently the co-chair (along with Dr. Thomas M. Lenard) of a Working Group convened by the Progress & Freedom Foundation (PFF) to propose a "New Spectrum Policy" for the U.S., as part of PFF's multi-faceted effort to provide a "Digital Age Communications Act" (DACA) that would guide the reform of U.S. telecommunications policy. Our Working Group recently unveiled "Release 1.0" of its Report, which I would like to submit for the record of this hearing.

As the "Release 1.0" characterization indicates, the New Spectrum Policy Report is still a work in progress and will likely go through some refinements in the coming months, as well as being accompanied by specific legislative language. Though no member of our Group—composed of one or more economists, lawyers, and electrical engineers—may agree with every single word in the current Release, we all agree on the major thrust of the Report: *that the current system of "command-and-control" regulation of the electromagnetic spectrum has yielded and will continue to yield large and growing inefficiencies in spectrum use, and that a "propertization" of the spectrum—a system that would rely primarily on a framework of fully developed property rights and markets in spectrum—would yield great benefits for the U.S. economy.*

In the rest of this written testimony I will summarize the "Release 1.0" of our Report. (Since "Release 1.0" is being submitted for the record together with this written testimony, the interested reader of this testimony who wants more detail, support, and citations can find them in that Report.)

I. The Problem

The widely recognized problem with uninhibited radio transmissions is "interference": one party's transmissions interfering with those of another party in the same (or a neighboring) geographic area and/or spectrum band. Another way of describing this problem is that it is one of negative externalities or spillover effects.

II. Potential Ways of Managing the Problem

There are three potential ways of managing the use of the spectrum, so as to deal with interference: (a) the traditional command-and-control regulation and licensing approach; (b) a commons/unlicensed approach; and (c) a propertization and markets approach. The first is the approach that has been prevalent in the U.S. since 1927—first under the auspices of the Federal Radio Commission and then, from 1934 onward, under the auspices of Federal Communications Commission (FCC). The second has recently been advocated by a group of technologists and legal scholars. The third is the approach favored by the Report, taking as its origin a seminal 1959 article by Nobel Prize winner Ronald Coase.

III. Traditional Command-and-Control Regulation and Licensing

Since 1927, Federal law has declared the spectrum to be a national resource, to be managed by the Federal Government for the benefit of the American people. In practice, this has meant a regime of detailed command-and-control regulation and licensing by (since 1934) the FCC: The FCC has traditionally allocated specific spectrum bands and geographic areas to specific uses, mandated specific service parameters, and selected specific users (through "beauty contests") to hold the licenses for these bands, geographic areas, uses, and service parameters.

This approach broke down in the 1980s, when the FCC was swamped by applicants for the licenses for the newly opening (and clearly seen to be highly profitable) cellular services. The Congress came to the FCC's rescue by authorizing lotteries among the large numbers of otherwise qualified applicants. After the lotteries were revealed to yield rapid "flips" and large windfall gains, the Congress authorized auctions in 1993, which have been held for cellular and similar services since 1995.

Despite the widely acknowledged success of these spectrum auctions, and the FCC's recent efforts to grant greater flexibility to auctioned spectrum and to encour-

age a secondary market in spectrum, the overwhelming bulk of spectrum in the U.S. remains subject to the FCC's command-and-control regulation and licensing.

The costs to the U.S. economy of this rigid management approach have been documented and are now widely appreciated. Spectrum is utilized inefficiently. New products come to market later and at higher costs. Competition and innovation is impeded. For example, the rollout of cellular service in the U.S. was delayed for over a decade, while the FCC tried to figure out how to integrate this new service into its existing allocation scheme. Even today, after over a decade of auctions that have authorized larger swaths of spectrum for cellular service, it's clear that even greater allocations would be worthwhile and could lead to lower prices and improved services.

IV. The Commons/Unlicensed Approach

The success of the FCC's experiments in allocating some spectrum bands to "unlicensed" low-power uses—e.g., garage-door openers, WiFi, and Bluetooth—and the advent of newer technologies, such as cognitive radio and mesh networks, has led some technologists and legal scholars to advocate the expansion of such unlicensed bands. At the limit, with sufficiently good technologies, limits on power emissions of transmission devices, and adherence to courtesy protocols (the advocates argue), the spectrum could become a vast "commons," where formal management of the spectrum—either in the FCC tradition or using the property rights approach discussed below—would not be needed (and indeed, would introduce transactions costs and would impede full development of the spectrum). In essence, there would be an abundance of usable spectrum, so formal allocations would not be necessary.

The Report is highly skeptical of such claims. The demand for spectrum use is likely to be so price elastic that effective boundless abundance (i.e., effective supply would exceed demand, even at a zero price) is unlikely to appear. Further, the power limits and courtesy protocols necessary for a commons are just an alternative form of government command-and-control regulation. And the haziness of property rights and enforcement rights in a commons world would likely discourage the large-scale investments that would be needed in some areas for efficient spectrum utilization. The Report expresses the fear also that the continued governmental regulatory presence would mean that political considerations would trump efficiency in regulatory decisions. And, finally, the Report explains that propertization and markets can handle the kinds of uses—e.g., garage-door openers and WiFi—that are currently extolled as successful unlicensed uses. For example, an equipment manufacturer could buy the rights to use a specific spectrum frequency band (say, for garage-door openers) and then sell equipment designed to operate on that frequency to consumers.

In any event, the Report advocates "grandfathering" existing unlicensed spectrum bands for continued use along current lines. If in the future, governments want to create and set aside additional "spectrum commons," they should be required to buy the spectrum in the open market (as would everyone else in a propertization and markets framework), and careful benefit-cost analyses should be expected for any such purchases and uses.

V. Propertization and Markets

The third way to manage the spectrum so as to deal with interference—the direction that the Report endorses—is the approach of creating property rights in spectrum. The property rights would consist of a right to transmit within a specified geographic area and a specified spectrum frequency band, with limits on the power of the transmissions at the geographic and frequency band borders, and limits on in-band power as well. Another way of thinking about the property rights is that they constitute the right to exclude—exclude others' transmissions within the property owner's geographic and spectrum band territory.

Within these limits, the spectrum owner could employ the spectrum for any use/service, so long as she didn't "trespass" with excessively powerful signals on the property of her neighbors. A spectrum property holder could add to her holdings, sell some of them off, divide, lease—and even just not use her spectrum if she so chose.

Indeed, a convenient metaphor for these property rights in spectrum is that of real estate: The property owner of a bundle of spectrum rights could think of those rights as roughly equivalent to those enjoyed by the owner of a piece of real estate. The rights and activities enjoyed by the spectrum owner could equally well describe those enjoyed by a real estate owner. The Report envisions spectrum markets for transactions developing, just as real estate markets have developed for commercial and residential real estate. Also, of course, the antitrust laws would apply to any

agglomerations of spectrum, so as to prevent such agglomerations from creating positions of market power.

Any initial specification of these spectrum property rights—the geographic boundaries, the spectrum band boundaries, the power limits—ought to be capable of being renegotiated by owners among themselves in subsequent transactions, as market conditions and technologies of transmission and reception change. But because such negotiations are costly, the initial allocations should be structured—initially by the FCC—with an eye toward minimizing such subsequent transactions. The FCC’s Evan Kwerel and John Williams have suggested that the parameters that apply currently to auctioned personal communications services (PCS) spectrum would be a useful starting place for much, if not most spectrum in a propertized framework. Also, the Report notes that cognitive radio, whose development is seen by commons advocates as a boon to the commons approach, may well help reduce transactions costs in a propertization approach, since the need to amass adjacent spectrum bands for a particular service would be reduced.

VI. How to Get From Here (Command-and-Control Regulation and Licensing) to There (Propertization and Markets)

If the U.S. were starting with a clean slate—i.e., if there were no current users of spectrum with implicit rights to the spectrum that they use—there could be an initial laying out of spectrum property “plots” and then an all-inclusive auction to get those plots into the hands of those who could use them most effectively. With well-defined property rights applied to these spectrum plots, secondary markets in spectrum would quickly develop.

However, the U.S. starts instead with the existing “legacy” system of “encumbered” spectrum, based on the FCC’s command-and-control regulatory and licensing system described above. Some spectrum holders have recently purchased their spectrum in the auctions of the past dozen years. Others received their spectrum gratis through a beauty contest. Yet others purchased their spectrum indirectly by buying a company (e.g., a radio or TV broadcaster) that had spectrum rights. Virtually all are likely to have made substantial investments in equipment and other complementary inputs to the use of their spectrum. In addition, there are some spectrum bands that are currently unassigned or that are lightly used and encumbered. And various governmental bodies have a claim to approximately a third of the available spectrum.

Consequently a major challenge to implementing a propertized spectrum framework is designing the transition from the current legacy system to a propertized system. The Report identifies five distinct options for a transition to a propertized system for spectrum. Under any of the options, a “National Spectrum Registry” should be established (much like land registries), so as to facilitate spectrum transactions and negotiations. The Registry could be maintained by the FCC, by the National Telecommunications and Information Administration (NTIA), or by a private entity.

The five potential options discussed in the Report are as follows:

- 1) *Auction spectrum with the rights to clear incumbents immediately without compensation.* In essence, current spectrum users would retain no residual rights and could be removed by the purchasers at will.
- 2) *Auction spectrum with rights to clear incumbents with compensation.* Clearing would entail paying either relocation costs or, if the value of the incumbent’s operations is less than relocation costs, paying the incumbent to cease operations. If the clearing costs are readily known or quickly adjudicated, this option will usually yield efficient outcomes.
- 3) *Auction spectrum without rights to clear incumbents from the auction spectrum.* Buyers of the spectrum would be required to negotiate with incumbents to change the configuration of the latter’s rights. This option is similar to one recently proposed by the British telecommunications regulator, Ofcom, as well as to a proposal by Senator Larry Pressler in 1996.
- 4) *A “Big Bang” auction with unassigned and encumbered spectrum.* Incumbents would be encouraged to bring their spectrum voluntarily to auction. Incumbents could either be permitted to repurchase their existing rights at no net cost to themselves, or they could be given transferable vouchers to compensate them for mandatory clearing.
- 5) *Give incumbents full property rights to the spectrum that they already use.* Current spectrum users would thereby gain immediate flexibility in terms of adjusting inputs and altering uses, so long as they did not thereby generate interference with an adjacent spectrum owner’s property rights.

The Report rejects options 1 and 5 as, at best, likely to lead to great delays in implementation. The Report does, however, endorse options 2–4 as all reasonable

choices and, if properly implemented, could provide an efficient and timely transition to a propertized and market-oriented spectrum regime.

VII. Government-held Spectrum

Government at all levels (Federal, state, and local) now hold about a third of all available spectrum. Even in a propertized framework, so long as spectrum is a “free” resource to a government agency, there is no clear incentive for the agency to do other than to hoard its spectrum against the possibility that it may be useful sometime in the future. The Report does recommend, however, a number of measures that can encourage greater efficiency in the use of publicly held spectrum:

- 1) Include government-held spectrum in the National Registry.
- 2) Require that NTIA prepare and submit annual reports to Congress on spectrum usage by government.
- 3) Establish reward structures that encourage government employees to economize on their agencies’ uses and holdings of spectrum.
- 4) Government entities at all levels should be expected to purchase any additional spectrum rights that they want to use.
- 5) Try innovative ways to promote efficient use of government spectrum, such as contracts let by government public safety agencies that would allow contractors to provide public safety spectrum services in return for rights to use that spectrum when not needed for public safety.
- 6) Generally encourage purchase of communications services in place of grants of spectrum.

VIII. The Legal Standard for Enforcement of Spectrum Property Rights

Spectrum property owners need to be able to have legal recourse in the event that someone breaches their property right—in essence, if someone trespasses on their spectrum property. It is also critical that the property rights be as clearly defined and unambiguous—and that the adjudication process be as simple—as possible.

The Report endorses the concept of using the law of trespass as the appropriate legal framework. Detection of trespass could be based on measurements at the (geographic or spectrum band) boundary or could be based on measurements at the transmitter combined with a radiation propagation model that indicates the consequent emission levels at the boundaries. The latter approach currently works well for the quasi-property-rights regime that applies to the PCS bands. Also, some allowance may be necessary for the stochastic properties of transmission power strengths that are due to environmental conditions.

Enforcement could be through the Federal court system or through adjudicatory proceedings in a reformed FCC (as described in the DACA Institutional Reform Working Group’s report).

IX. International Obligations

The Report recognizes that the U.S. has international obligations with respect to spectrum usage and interference and advocates that all spectrum rights that are created in a propertized framework should be consistent with those obligations.

X. The Role of the FCC

The FCC would have at least one and possibly two additional important roles in the propertized framework advocated in the Report. First, the FCC would be responsible for the initial implementation of the property rights regime—the auctions, the initial specifications of geographic and spectrum band boundaries, the specification of power limits at the boundaries, etc. Second, the FCC could be the agency that maintains the National Spectrum Registry. Third, the FCC could be the initial forum for the adjudication of spectrum property disputes.

XI. Conclusion

A relatively new approach to spectrum management—based on property rights and markets—holds great promise for improving the efficiency with which the spectrum is utilized in the U.S. economy and for encouraging innovation and competition. The Report describes and explains this new approach and identifies three sensible options for a transition from the current command-and-control regulatory and licensing regime to a propertization and markets framework for spectrum. A rapid commitment to one of these options would surely be in the best interests of our country.

The CHAIRMAN. Thank you very much.

If I could urge you to sort of move together and bring back our three witnesses. We are going to have to share six mics here with nine people. I appreciate your courtesy, the first three witnesses staying with us. We are going to each have a 5-minute round to start with. I am going to wait until last this time and see. Senator Lautenberg you may start off please.

Senator LAUTENBERG. Thanks very much, Mr. Chairman. Your management of this wide spectrum, so far it has been pretty good.

The CHAIRMAN. Its properitization of the witness statements.

Senator LAUTENBERG. I think some of it has to do with your position, Mr. Chairman.

[Laughter.]

Ms. Seidel, you are there? Yes. It appears that with the large wireless companies we have seen something recently—the gaming of the DE program, a program that was designed to help small minority and woman-owned businesses. Can the FCC have this problem fixed by the next auction that is scheduled for June?

Ms. SEIDEL. The record on the NPRM has already closed. The Commission has announced its intention to resolve the issues in advance of the advanced wireless services auction.

Senator LAUTENBERG. Let me ask you, do you think, can we get it done by then? There seems to be considerable doubt among the witnesses about whether or not this can be done as planned.

Ms. SEIDEL. That is the Commission's intention at this point in time.

Senator LAUTENBERG. Mr. White, yours was, I would say, an interesting, semi-scathing review of the system as we know it. It is constructively received, I can tell you. You had a substantial amount of testimony to give in a very short period of time. If you had to highlight one principal avenue for correcting it, what would you say using the property analogy to just let different suppliers offer different services within the same spectrum? I am not sure I understand that.

Mr. WHITE. Senator, thank you. My principal avenue is “think real estate.” If there is nothing else I could say, think real estate. You have a geographic area. You have a spectrum band, and it is yours. You can do with it what you like, so long as you do not exceed power limits at the boundary so that you don't trespass on your neighbors. Again the real estate analogy, so you should not be trespassing on your neighbors but within your area, within your spectrum brand you can do what you like. You can add. You can divide. You can lease. You can flexibly allocate your spectrum to the highest and best use without the FCC or anybody else telling you what to do, so long as you don't trespass. And of course we've got to have antitrust—I am a former Chief Economist of the Antitrust Division in the U.S. Department of Justice. I am very sensitive to issues of market power with respect to agglomeration possibilities. I believe the Antitrust Laws ought to be applicable here, just as they are elsewhere in the U.S. economy. It is about encouraging flexibility, and that is what markets are all about.

Senator LAUTENBERG. If you use the real estate analogy, one can build lots of very small apartments or very few very large apartments. In this case, can the variety of services be given outside the spectrum on a competitive basis, so that there would be further in-

ducement for serious competition? How do you do it, for instance, cellular phone service?

Mr. WHITE. Senator, if you think there is a buck to be made in cellular, you would be able to go out, buy yourself a swath of spectrum, and start offering cellular services. You wouldn't have to go to Washington.

Senator LAUTENBERG. I can't do it on your property in the real estate business.

Mr. WHITE. Ah. But you can buy access to a certain wave band over as big an area as you want. In fact, the new—

Senator LAUTENBERG. Buy it from the licensing?

Mr. WHITE. Buy it from the existing license holders who may be using it for something else and you say, "Hey, do I have a deal for you." (You can tell I am from New York City.) Do I have a deal for you. Let me have access to your spectrum, etc., and you can start offering cellular service. We rely on markets for much of our everyday life. We rely on markets in the way we deal with real estate. We rely on the law of trespass to keep neighbors out. We would rely on the law of trespass to keep others out of your spectrum, but it could be a very wide, nationwide swath of spectrum.

Senator LAUTENBERG. Mr. Chairman, as a courtesy to colleagues, there is so much to ask here and so many people to ask it from, but I will yield my turn now.

The CHAIRMAN. Thank you. Senator Pryor, you would be next on the early bird list.

**STATEMENT OF HON. MARK PRYOR,
U.S. SENATOR FROM ARKANSAS**

Senator PRYOR. Thank you, Mr. Chairman. Let's see. I would like to start with the FCC if I could and I am sorry, is it Ms. Seidel? Ms. SEIDEL. Yes.

Senator PRYOR. I would like to just ask about the E-911 Phase II that the FCC is working on. As I understand it, you set a date in which the various carriers had to meet a 95 percent goal. A number of those carriers have asked for waivers. They are close to the goal but some of them are not at the goal yet. My question for you just practically is when will the FCC rule on the waivers?

Ms. SEIDEL. The FCC does have a number of waiver requests pending from Tier I, Tier II, and Tier III carriers. Tier III carriers are the smaller and often rural carriers. It is a priority for the bureau. E-911 deployment continues to be a priority for the Commission and we are working quickly to be able to provide the Commission with the information they need to decide these waivers.

Senator PRYOR. OK. So are we thinking that will happen in the next few days? Few weeks? Do you have a timeframe?

Ms. SEIDEL. It would be difficult for me to say.

Senator PRYOR. Now let me ask this, Ms. Seidel, and that is about the wireless build-out rules and I know that there is—basically, when you look at the wireless build-out rules, I know they defer from service to service a little bit, but generally they have a focus on population coverage rather than geographic coverage. Has the FCC considered revisiting its build-out rules to focus on geographic coverage to ensure more build-out in rural areas?

Ms. SEIDEL. Certainly, the Commission does have construction requirements and build-out requirements for the various services and they do depend upon the nature of the service and the geographic area of the license. Historically, the build-out requirements have been based on population, but as the market has evolved there have been some who have had advocated build-out requirements based on geographic coverage, or a use-or-lose approach. These are issues that were teed up in a rulemaking proceeding by the Commission. We have received a wide array of comments and those are being considered.

Senator PRYOR. One thing I might suggest is the FCC could consider such an approach where you consider more geographical ramifications to that as a part of this analog spectrum being returned. And that maybe there might be some rural build-out that is auctioned off. But if I can ask the NTIA a question and I am sorry, is it Mr. Kneuer?

Mr. KNEUER. Yes.

Senator PRYOR. Mr. Kneuer, as you well know last year as a part of the DTV transition, Congress basically told the NTIA to execute a program that would provide necessary assistance to certain TV households that will require additional equipment in order to receive over-the-air digital. I am just curious about when the NTIA rules will be established for that and if you need any more guidance from Congress on that.

Mr. KNEUER. Well, the short answer is as quickly as possible. The DTV Transition Act puts us on a very tight timeframe, not just to get rules in place but to get forms of financial assistance for set-top boxes out to the American public and in sufficient time in advance of the transition. That is rapidly coming upon us. So we are working diligently on rules now or at least proposed rules that we will put to the marketplace to answer those sorts of questions, defining who are the eligible households, what are the characteristics of the set-top boxes and so forth.

Senator PRYOR. Are there any preliminary rules that are available now, so we can get a progress report on that?

Mr. KNEUER. The draft rules should be out soon. We do not have any preliminary rules out. The legislation was signed just a matter of months ago, so we have been working on it diligently since. I expect those rules to come out shortly, but we don't have a preview of the proposed rules.

Senator PRYOR. Mr. Kneuer, I am also concerned about user fees with governmental spectrum and I am curious about whether—if you take a user fee approach? If a Federal agency like the Department of Defense or non-Federal agencies like local law enforcement—local public safety might have to pay user fees.

Mr. KNEUER. As a part of the President's Spectrum Initiative, we have a task force working on a variety of incentives for a more sufficient spectrum use for Federal agencies. Included in that proposal is the possibility of imposing fees that would recognize the value of the spectrum. Currently, the agencies pay fees to NTIA based on the applications that they process. That is basically just a recovery of the administrative costs, the funding of the agency. We are examining the possibility to extend fees in that regard. With regards to state and local governments, they fall under the purview of the

FCC. The President's budget includes fee authority for the FCC for non-auction services. I don't believe that the consideration for that proposal will be extended to state and local entities—that is for other non-auctioned systems and non-auctioned licenses.

Senator PRYOR. Thank you. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. Senator Allen.

**STATEMENT OF HON. GEORGE ALLEN,
U.S. SENATOR FROM VIRGINIA**

Senator ALLEN. Yes, thank you, Mr. Chairman. The Wireless Innovation Act that I introduced on a bipartisan basis with Senators Kerry, Sununu, Boxer and Dorgan. I know the Chairman introduced a measure as well on this, is very important, in that we want to unleash the power of advancements in technology and innovation to develop wireless broadband to areas that presently don't receive it, particularly in rural areas, where as my friend from Montana says there is a lot of dirt between light bulbs. It will be more affordable and as this part of the spectrum that is unused goes forward after the switch from analog to digital, we ought to utilize it as best we could. For example, in Richmond it is estimated that 64 percent of the spectrum allocated to broadcast television use in Richmond will be vacant and unused after February 2009. Let me ask this question and I will address it to Mr. Kahn and Ms. Kenney. We had this plethora of witnesses. We introduced this because we do believe it is the most robust and efficient use of this particular unused spectrum. We believe it will lead to rapid innovation and result in many benefits to consumers. I do want to talk about interference, but could you elaborate, Mr. Kahn and Ms. Kenney, on what you would see as the benefits? The benefits from this to American consumers, if this legislation became law.

Mr. KAHN. OK, I guess I will try it first. Certainly, we see two major places where there are benefits. First—and we tend to categorize them as the sort of so-called higher power uses of that spectrum and the lower power uses of that spectrum—the higher power uses of the spectrum really are the broadband services, the broadband access ability. I think a number of people have observed the paucity of broadband availability or uptake by U.S. consumers versus some other parts of the world. Part of the problem, of course, is the cost of making broadband available in a relatively low-density environment. Even when you get out into the more distant suburbs of the metropolitan area, low-density starts to be an issue—it is the amount of cost of running a wired infrastructure. Wireless is very attractive for that. You have a very natural sort of way to expand your capacity as you get more people taking it, which tends to argue that you get a somewhat incremental investment path. Your coverage areas are relatively large, given the right spectrum. So, the ability to actually get a good broadband service out there, particularly in the lower-density parts of the country, would be greatly enhanced by using this very good quality spectrum. Not all spectrum is created equal. This happens to be some very good quality spectrum.

The other place is the low power uses. You only have to look as far as all of the electronic devices people are carrying and putting in their homes today to see that there has been an explosion in in-

novation around new capabilities for people to utilize radio-based devices. All those devices also benefit; they are much lower power. The trade offs are different when you get into things like the sensing issues we talked a little bit about. But again, an enormous potential for new applications for the average consumer, again very cost effective price points because we know how to build this stuff very cheaply.

Senator ALLEN. Ms. Kenney.

Ms. KENNEY. Thank you. Well, I think Mr. Kahn summarized the technological benefits of unlicensed devices in the broadcast band. One thing I would like to point out is that the nature of unlicensed allows providers, whether they be communities or entrepreneurs trying to make a profit, to use low-cost, off the shelf technology. Because of the propagation characteristics of the spectrum within the broadcast band, you need fewer transmitters. So, you have got lower cost equipment available to you, and with this spectrum available, providers will need less of it. So, that allows a provider to offer a very low cost service to consumers. Right now broadband is available at \$30, \$40, \$50 per month. Some have estimated with unlicensed devices in the broadcast band, we could see broadband service available for as little as \$10 per month, which would be significant for those consumers who have access to broadband but simply can't afford it.

Senator ALLEN. Good. I have 5 seconds. On our interference matters, Mr. Kahn, Ms. Kenney, if you would, do you believe the requirements that we have put in our legislation, the Chairman's bill is fairly similar, do you believe those requirements are sufficient to alleviate any interference concerns?

Mr. KAHN. Absolutely. First of all, any equipment that goes into the service is going to be certified by the FCC. They have a pretty stringent certification process. They will work the technical issues around the details of this.

Second of all, the interference, as I said in my comments, for the high power people, you know where you are putting these transmitters. You know that there isn't a television station within reasonable distance of that. That is an easy one. For the low power devices, we have very credible ability to do sensing. Just to give you some analogy there that may be helpful for the non-engineers (I know most of you aren't): You know sensing is not about being able to hear the TV station, it is about being able to hear the fact that it is there. This is the difference between looking across the room and knowing that some people must be talking because you kind of hear some noise, versus being able to understand what they are saying. It is much easier to know there is noise, and that is all you have to know to get out of the band. It is much harder to know that you can decode it. So, our ability to sense the presence of TV channels, this is not a technically overwhelmingly difficult challenge. It is very feasible stuff with the FCC, technical diligence, absolutely. We have no interest in seeing television stations harmed. It is not in our interest or anyone else's.

Ms. KENNEY. If we had any concerns that interference with television reception for over-the-air-reliant households would be a problem with unlicensed broadband in this spectrum area, we couldn't support this proposal. But we have listened to the experts, we have

looked at the evidence and with the protections in your bill and Senator Stevens' bill, we feel confident interference will not be a problem.

Senator ALLEN. Thank you all. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. Senator Burns?

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

Senator BURNS. Mr. White, I want to activate you again. Under your system now, you are calling for, I would imagine a quasi privatization of spectrum. Am I hearing you wrong?

Mr. WHITE. I really want to stay away from the word privatization.

Senator BURNS. I know. I should have too.

Mr. WHITE. There is plenty of room for government use and holding of spectrum. We can have greater efficiency in its use, but there is lots of room for government use.

Senator BURNS. Now, once we secure a piece of spectrum now, don't we have property rights over that spectrum?

Mr. WHITE. Well, if you are channel 4, yes, you have some rights, but you can't just sell it to anybody. You need the FCC's approval to be able to sell it to somebody. You can't change your use. You can't decide that, "Maybe using it for cell phones, for AWS, might be a better use of that spectrum." You can't do that right now. So, yes, there is a set of rights. They are defined by the FCC, but they are not the way we would think—again thinking real estate is really useful. They are like real estate.

Senator BURNS. Do you think that spectrum is a national resource?

Mr. WHITE. So is all 3 million square miles of land in the United States, and yet we rely primarily on private ownership. Again, there is room for government ownership, for national parks, for local parks, of course. We rely primarily on private ownership to think about how land ought to be allocated, whether you ought to be growing wheat on it or corn or using it for housing or using it for automobile assembly plants. Those are private decisions. You do have to worry about some harmonization. You don't want a glue factory going up right next to a residential neighborhood. So there are some neighbor issues, but primarily law of trespass, law of nuisance, can help deal with those problems. One of the ironies is that the advocates of spectrum commons see agile radio, cognitive radio, as one of the great advances that will make a spectrum commons more feasible. But it will also make propertization more feasible because if you wanted to aggregate spectrum to offer cellular services, you don't have to worry about a holdout problem—perhaps that Senator Lautenberg is holding this choice piece of spectrum and without it, you can't offer the service with cognitive radio. Your receivers and your transmitters will be able to skip around. There are other suitable pieces of spectrum that will work for you. You get competition out there.

Senator BURNS. Thank you very much. I have another appointment. I thank you for your explanation of that.

Mr. WHITE. Thank you.

The CHAIRMAN. Thank you. Let me start back with you, Mr. Kneuer. I seem to hear you say that you are looking at the concept of allowing agencies that have spectrum, that are not using it, to lease or to—I guess lease would be the idea—do you think you have that authority now?

Mr. KNEUER. Well, I think the concept of allowing agencies to lease their excess spectrum, to the extent they have any, is something that is captured within a lot of the different issues that we are looking at.

The CHAIRMAN. That is not my question here. Do you think you have got the authority to do that without an act of Congress?

Mr. KNEUER. That may require legislation.

The CHAIRMAN. I hoped you would say that.

Mr. KNEUER. It is not a proposal that we currently have formulated.

The CHAIRMAN. I would hate to see the NTIA start competing with FCC in terms of spectrum sales or leases. I think there should be one national system. I would not like to see that start. I would be pleased to work with you on whether or not it should take place, however. I think there is no question about it. The agencies that have spectrum that do not fully utilize it should consider how to use it right. I would think that it would be a job for the FCC to add it to their spectrum sales. I would like to see the FCC start thinking about the concept of how to get some temporary use of spectrum that government agencies have and they don't have the capability of using it. I think it ought to be made available for use until the agencies can fully utilize it. Mr. Kahn, how long will it take you to develop, not you but anyone, but I assume you would be involved in it, to develop these personal, mobile, unlicensed wireless devices? I assume that you are confident you can prevent interference. By the way, this is a stupid question but what is it going to do to my garage door or someone else's heart monitor?

Mr. KAHN. It should not do anything to any of those. Not a stupid question.

The CHAIRMAN. Your devices would take into account these problems?

Mr. KAHN. Yes. The industry has shown it can move pretty quickly on these kinds of things. If you look at the history of any of the other unlicensed devices, you know, you are typically talking about a couple of years of standardization and development time. You will see early movers that get product into the market very quickly, within 12 months. Often, they call it pre-standard, while the industry is still working out agreements on what the standards really should look like. You will see those things evolve to be standardized.

The CHAIRMAN. Those devices would be distance sensitive?

Mr. KAHN. I am sorry?

The CHAIRMAN. They would be distance sensitive? I mean what if someone from the rural area comes into town and wants to use their device?

Mr. KAHN. Oh, well. The proposal here, at least the one that I think is the most reasonable, is that the devices themselves are responsible for sensing the spectrum. So, you could take one of those devices and wherever you take it, the first thing it does is it scans

the available channels to find one that is not in use. I mean if you take a device, you use it in Anchorage and there are a lot of vacant channels up there. So it picks one that is open. You go to Salt Lake; it will go to a different channel. The first thing it is going to do is find an open channel. The whole design and certification process is designed to guarantee that those devices settle on channels that are not otherwise in use. In that sense, they are aware of the environment that they are operating in. I don't know if I answered your question.

The CHAIRMAN. Yes, it does. I didn't realize the impact of that, searching for the channel. Ms. Hecker, do you think we should have a comprehensive survey of spectrum use nationwide and would that assist us in terms of the reform? If we do that, what role would the private spectrum users play in that survey?

Ms. HECKER. Well, as I mentioned, we have two recommendations. One was for FCC and NTIA to get together to have a comprehensive government plan that would include an inventory. The other recommendation, actually, was for a commission that would be much more broadly based dealing with all of the users, the range of public users, private users, as well as the government agencies at different levels of government. The idea of that kind of commission would be to recognize what we have today is really almost a numbingly complex issue and set of issues and that what really is needed, given the absence of clear consensus and the range of views, is to have that kind of comprehensive independent commission really look at the use and opportunities for improvement in the use of spectrum. The status quo in our view is not sustainable. Substantial reform is needed but there isn't really yet a clear consensus and that kind of commission would have the opportunity to represent the Congress and the range of public and private users on a new agenda.

The CHAIRMAN. What timeframe would that commission have to report in? What are you looking at? What would you suggest?

Ms. HECKER. We never had a specific recommendation. Big commissions in the past often have 18 months to 2 years. A lot of it would depend on the depth of the agenda, that the Congress, if they formed such a commission, provided to the group, how it would be staffed, and what kind of outcomes. Would it not only identify what kinds of reforms we needed but I think as the DACA report, would it have the transition plans of exactly how to get there? And also would it address what kind of institutional reforms might be needed as we believe ought to be considered in the current structure of spectrum management bifurcated between FCC and NTIA?

The CHAIRMAN. Mr. Walsh, could you tell us if national spectrum licenses are issued to a company, should it be required to use the spectrum in rural areas or lose it?

Mr. WALSH. Yes, Chairman. The RCA's position on that is that we feel that spectrum lying fallow should be used. So our position is that if spectrum is unused that it should be able to be turned back into the FCC and be able to have an auction and have those parties that are interested in that particular piece, take advantage of that.

The CHAIRMAN. Ms. Seidel, do you currently keep track of whether or not spectrum is used?

Ms. SEIDEL. The Commission does have build-out requirements and construction requirements, which enable us to keep track to some extent. In addition, there have been spectrum audits in the past. Most recently, I think it was in the paging arena where the Commission did seek information about what licenses were being used and the extent to which they were.

The CHAIRMAN. Do you make that information available to the public?

Ms. SEIDEL. I think I will have to get back to you on that question to make sure I give you a complete answer.

The CHAIRMAN. Would you favor this commission that Ms. Hecker speaks of?

Ms. SEIDEL. I really couldn't provide you with the Commission's view on that.

The CHAIRMAN. Mr. Sugrue, do you think spectrum reforms would help lower the price of wireless broadband and help ensure that that service could reach rural high cost areas?

Mr. SUGRUE. Oh certainly. While I addressed my remarks to getting the auction—that's scheduled in 4 months to take place—I want to align myself with a lot of the progressive thoughts on spectrum reform across the table here. Anything that lowers the opportunity costs of obtaining spectrum and makes it available to be used more efficiently would do that. For rural areas, I would also say the 700 MHz auction, which is scheduled now to take place in January 2008, the propagation characteristics of that spectrum are very, very good for rural areas. Much better, for example than the AWS or the PCS frequencies. As a carrier that doesn't have any of that lower band spectrum we look forward to the availability of that as an opportunity to move in an efficient fashion in some areas of the country that we are not now.

The CHAIRMAN. Thank you. Mr. Hubbard. Can you estimate how much it would add to the cost of DTV set top boxes if they could warn of the nearby-unlicensed wireless devices? Do you understand what I am saying? Can we add to those boxes this warning capability so that they would know unlicensed wireless devices and would not be interfered with?

Mr. HUBBARD. I don't know the answer to that. I am not in the business of making television sets, but I do know that many CE manufacturers, and actually I would request that this letter is submitted into the record,* from consumer electronics manufacturers who are expressing this grave concern over interference issues. The second question is what do you do with existing sets? What do you do with existing equipment that is out there? There are millions of sets that are already in existence, so even if you could make a new rule that protected something moving forward, you still have the legacy issue which would need to be considered.

The CHAIRMAN. Do the rest of you agree that the older sets could be affected by these devices we are talking about? Mr., Kahn, what do you think?

*The information referred to is printed in the Appendix.

Mr. KAHN. No, I think our position is pretty clear that we don't want to be transmitting even with low power radios on occupied television channels. The goal here is not for the TVs to put up with interference generated by these devices. The goal here is that the devices are on a different channel. So, we honestly don't see that as the issue. As I said before, we have interest in television as well. I mean we are seeing increasing pressure from our customers who want to put TV receivers on all their laptops and PCs. So, the idea of getting good over-the-air television is important to Intel. We have no desire to see that corrupted in any way. Our position is that it is extremely feasible to operate on channels that are not utilized in a given marketplace. When you do that, you are not interfering with the reception on any television, old or new. So the issue here is can you identify the channels that are not in use. Anywhere you go you are going to find channels not in use, more in the rural areas, fewer in the high density metro areas, but nevertheless even in the high-density metro areas there are lots of channels not in use. Then utilize those channels with very low power devices.

The CHAIRMAN. Thank you. Ms. Kenney. To the Consumers Union, what is the most important item in this spectrum reform concept we are dealing with?

Ms. KENNEY. The most important thing that this Committee could do would be to pass legislation comparable to that, which you have introduced, on the TV "white spaces" and Mr. Allen's bill. They are very similar, and have similar goals.

The CHAIRMAN. Do you foresee any possibility that people could use that "white space" to the extent where they build up considerable income? They are still not paying anything at all for that use. That is your suggestion, isn't it? That there would be no charge in that "white space?" Right?

Ms. KENNEY. Yes.

The CHAIRMAN. My bill contemplates that, but what if someone does develop just a significant income from that "white space" spectrum? Should they pay something for its use?

Ms. KENNEY. Well, the beauty of unlicensed spectrum is that a lot of people can compete within that same space. We certainly don't have problems with people making money by offering valuable consumer services.

The CHAIRMAN. But you are assuming it is only going to be used in one area, aren't you?

Ms. KENNEY. You could have multiple players operating within the same market.

The CHAIRMAN. What about one player operating in many markets for that "white space"?

Ms. KENNEY. Well, certainly if that is what is required to offer a competitive service to the dominant wireline providers, I am not sure we would have a problem with that, as long as others are allowed to use that space as well.

The CHAIRMAN. Mr. White, I have not ignored you. I just want you to know I hope once we get through this bill, I hope we can find a time to explore your suggestion. But I don't think we can put that in this bill at this time. I hope you realize that.

Mr. WHITE. Thank you, Senator. Yes. I realize that, but we hope that we are getting people to think creatively and start under-

standing the logic of the position of propertization and markets in spectrum and that next time a major piece of legislation is considered the role of propertization and markets can be the center of that legislation.

The CHAIRMAN. I recall when my good friend from Hawaii, Senator Inouye and I were able to finally get the spectrum bill passed and signed by the President. I called the then-Chairman of the FCC and asked him if they had a program at the FCC for bonuses to people who made suggestions that brought in additional funds for the government. He said, "yes, they did, but why was I interested?" I said, "Well, the President just signed that bill." He didn't think it was funny.

[Laughter.]

The CHAIRMAN. I did. I kind of played the same problem with you, though. How could you—that is why we want to have a hearing on your booklet and go through it. It is a good suggestion but to get from where we are now to there nationally, it is equivalent of changing from one type to another. I don't know how you can take this system and transit to your system without serious disruption in communications right now. So we want to hold a hearing and I am sure other people would like to explore that too, but I just have to tell you, it is too much I think to ask us to be involved in that in this bill.

Mr. WHITE. I understand.

The CHAIRMAN. I thank you for coming. My last request of all of you is if you think of something that you think we should have heard today, that relates to this problem we are dealing with on "white spaces" or spectrum reform, we invite you to send us—not another letter like the one I just got from you, Mr. Hubbard. I think that is going to take me a little while to read, but a short letter. We would welcome your additional comments on what we ought to do in this legislation. I thank you all very much. I thank the witnesses on the first panel who have been willing to stay and respond to the questions that my colleagues and I have had. We do appreciate your courtesy in appearing here today. Thank you very much.

[Whereupon, at 11:50 p.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. DANIEL K. INOUE, U.S. SENATOR FROM HAWAII

Last week, this Committee examined the communications challenges facing rural America and tribal lands. Unlicensed wireless technologies featured prominently in that discussion. If given the opportunity, unlicensed technology could very well be a low-cost means of delivering high-speed Internet services to remote areas.

In a world that has become dependent upon the instantaneous exchange of information, high-speed Internet access is quickly becoming a necessity. It is not an option to leave portions of our country behind. If our rural communities are going to have any hope of competing in a global marketplace, they will need to have access to broadband services. It is that simple.

Similarly, we need to put forward a far better effort to reach these same remote areas with cellular phone signals as well. As we work to deploy broadband, we cannot overlook the fact that many parts of rural America lack robust cell phone service.

There have been efforts to ensure that highway travelers do not lose service as they cross the country, but sadly, wireless providers, in many cases, fail to provide similar access to nearby rural areas, which is critical for public safety as well as economic development. I am hopeful that we can find ways to resolve this as well.

PREPARED STATEMENT OF SHURE INCORPORATED

I. Introduction and Summary

Shure Incorporated (Shure) is the leading manufacturer of wireless microphones and other high-quality audio products. As a well-known international innovator in high-quality audio products with over 80 years experience, Shure welcomes this opportunity to offer its expertise and real-world perspective on important interference concerns raised by proposed changes to the uses of the “vacant” TV spectrum.

Under Part 74 of the Federal Communications Commission’s (FCC) rules, Shure’s wireless microphone products operate as low power broadcast auxiliary stations. Broadcast auxiliary services are licensed services operating on a secondary basis in the limited amount of open spectrum not used by television broadcast stations in any given market, the so-called “white spaces.” Despite the moniker, the “white spaces” are not “white” or vacant. Numerous important services currently use the “white spaces.”

In 2004, then-FCC Chairman Michael Powell initiated a proceeding aimed at opening the “white spaces” within TV spectrum to use by unlicensed devices. The FCC asked whether unlicensed devices could coexist in the “white spaces” with incumbent services such as wireless microphones.¹ Shure and other companies demonstrated that the FCC’s proposal would cause harmful interference to wireless microphones and other important services. This interference will disrupt communications important to the American public, including newscasting, sportscasting, religious broadcasting and entertainment programming.

The variety of incumbent services in the “white spaces” presents complex and unprecedented interference cases. There is no proven interference solution available today that allows unlicensed devices to share “white spaces” with incumbent services. “Smart” technology is an intriguing concept that perhaps eventually could be developed into a reliable tool for resolving interference issues in certain situations. Shure supports the continued hard work and substantial development manufacturers in that field that will need to pursue to realize the full promise of “smart” technology. However, it is critical that today’s spectrum management policy is grounded in real-world, tested interference solutions and not on the mere promise of technologies hoped to be developed in the future. The stakes are too high to speculate. Harmful interference caused by permitting new unlicensed devices to operate in this occupied spectrum today will harm American consumers and businesses who rely

on high quality transmission of news, sport, religious, entertainment, and business events and programming.

Notwithstanding these significant unresolved interference issues, the two bills under consideration (S. 2327 and S. 2332) mandate that the FCC conclude its “white spaces” proceeding in 180 days and allow unlicensed devices to occupy this limited spectrum under certain conditions. The goal of these bills is to promote wireless broadband access, particularly in rural areas. Shure is concerned these bills impose unreasonable deadlines for FCC action and do not adequately account for the serious interference issues presented by unlicensed device operation in this spectrum. The public interest would not be served by unlicensed devices that cause crippling interference to licensed services.

The purpose of this statement is to explain Shure’s concerns and the technical hurdles that must be cleared before any “white spaces” proposal can reasonably move forward. Industry experts are currently studying these complex interference issues. These experts should be allowed to do their job and develop proven interference solutions before unlicensed devices are permitted to run roughshod over important licensed services. Finally, at a minimum, proposed legislation must be amended to make clear that (1) wireless microphones are an incumbent service entitled to protection from interference; and (2) unlicensed devices will not be permitted access to the “white spaces” until proven technical solutions adequately prevent interference from unlicensed devices to all incumbent services.

II. Wireless Microphones Are Vital to High-Quality Broadcast Productions

Wireless microphones are essential to today’s high-quality television and motion picture productions. Wireless microphones are used by the news industry, by sports and entertainment groups, and by religious organizations. Wireless microphones allow on-the-spot coverage of breaking news stories, providing the American public with critical and sometimes life-saving information. They enable unparalleled access to sporting events, making viewers feel as though they are part of the action. Wireless microphones are used at the Nation’s political conventions to bring full coverage to all points of view. Wireless microphones enhance religious broadcasts, enabling worshippers to practice their faith in richer, more enjoyable ways. The American public relies on wireless microphones to deliver these exciting and innovative communications.² In short, wireless microphones enable modern broadcast productions.

III. Introducing Unlicensed Devices to the “White Spaces” Without Proven Interference Solutions Would Devastate Wireless Microphones

Shure conducted an extensive technical analysis to determine whether wireless microphones could coexist with unlicensed devices, based on the technical parameters proposed by the FCC. Shure conducted dynamic “real world” testing to simulate an unlicensed device operating on the same channel in the presence of a wireless microphone. Shure proved that wireless microphones were rendered virtually useless in the presence of unlicensed devices. Crystal clear reception from the wireless microphone quickly began to drop out, and then degenerated to the point that the wireless microphone turned off completely. Last month, Shure also conducted its simulation for House and Senate staff to demonstrate the severe consequences of harmful interference.

Hallmarks of wireless microphones are their superior sound quality in real-time applications. In order to deliver the high level of sound quality and reliability that users expect, wireless microphones must operate in a known, stable interference environment. Unlicensed devices would disrupt that environment and make it inhabitable for wireless microphones. This is because there are no “second chances” for wireless microphone transmissions—you can ask someone to repeat what they said on a cell phone or to resend an e-mail, but you can’t ask someone to re-sing the National Anthem at the Super Bowl.³ Once interference occurs, the damage is done.

IV. Unlicensed Devices Also Present Serious Risks to Other Licensed Services and Devices

Unlicensed devices present serious interference issues not only for wireless microphones, but also for a wide range of other important services operating in the “white spaces” including other existing broadcasting services, public safety services, law enforcement services, medical telemetry devices, and low power and TV translator stations.

The broadcast and consumer electronics industries fear that allowing unlicensed devices as proposed by the FCC would wreak havoc on the DTV transition.⁴ The “cliff effect” of DTV means that it is an all-or-nothing technology, interference and loss of service means not just a poor picture, but no picture at all. Numerous consumer electronics manufacturers caution that “[a]s a matter of science and engineering, there is no question that the potential exists for interference from unlicensed

wireless devices to the operation of digital television receivers and set top boxes.”⁵ These manufacturers warn that “[u]nduly hasty action in establishing the rules and parameters for the operation of unlicensed devices could seriously disrupt the digital television transition for millions of Americans and taint the roll-out of unlicensed devices.”⁶ These respected manufacturers at the center of the DTV transition “urge the Congress to do nothing that would imperil or disrupt the DTV transition, including the authorization of new services which would cause interference with television signals.”⁷ Knowingly introducing interference without proven means to mitigate it needlessly threatens long-standing Commission and Congressional goals to institute DTV service.

The risks are not limited to DTV service. Set top converters used for cable and satellite reception, along with other consumer products connected to TV sets, are also vulnerable to interference from unlicensed devices.

Rural television reception is also in jeopardy if unlicensed devices enter the “white spaces.”⁸ Millions of people in rural areas live outside the so-called Grade B contours of broadcast stations and rely on broadcast service from low power television stations and translators. There is no protection for service outside the Grade B contour, exposing these viewers to harmful interference that would suddenly eliminate their television reception. This is especially unfair because over-the-air television is the primary source of emergency information and quality of life information available to rural America, a need unfulfilled by satellite television with its limited local channel offerings.⁹

Public safety also operates on several channels in the so-called “white spaces.” Such operations are typically mobile and itinerant—very similar to wireless microphones—making public safety devices very difficult to protect from interference.¹⁰ Medical telemetry devices operate in “white spaces” from channels 7–46.¹¹ These devices are used to monitor cardiac patients. Clearly, interference to public safety or medical telemetry applications risks health and safety and could have devastating consequences.

V. The Interference Issues Are Extremely Complex and Require Time to Resolve

In light of the substantial and widespread harm interference would cause, the key to moving forward is developing proven interference solutions that prevent interference and adequately safeguard the variety of spectrum uses in the “white spaces.” The range of “white space” incumbents further complicates this charge. Broadcasters transmit from fixed locations at very high power levels and should not be very difficult to detect. However, wireless microphones operate itinerantly at very low power and are therefore very difficult to detect. Viable technical solutions must be capable of detecting both types of devices to avoid widespread interference to millions of Americans. Although “smart” technology has been touted as a viable technical solution, as described below, no “smart” technology exists today that has been proven to remedy interference in the “white spaces.”

The FCC’s “white spaces” proceeding demonstrates that (1) unlicensed devices would interfere with incumbent services, and (2) no proven technical solution exists to protect incumbent services. The FCC asked industry to work together on these complex technical issues to develop solutions. IEEE, the world’s foremost association of electrical engineering and wireless networking experts,¹² established a working group (802.22) to study the interference issues resulting from fixed installations of unlicensed devices in the “white spaces.”¹³ IEEE is a neutral, impartial forum for consideration of technical solutions. Shure is an active 802.22 working group member. The experts at IEEE must be given adequate time to complete their important work to assure that the American public will not be subjected to widespread interference.

VI. “Smart” Technology Is Far From Ready

There is a widespread but erroneous perception that “smart” technology is currently able to resolve “white space” interference issues. This is not true. “Smart” technology goes by a variety of names—spectrum sensing, cognitive radio, dynamic frequency selection (DFS), and listen-before-talk. A form of “smart” technology eventually may be developed and tested to resolve the “white spaces” interference issues, but nothing proven exists today for the “white spaces.” As discussed below, “smart” technology is untested and has not been proven to remedy “white space” interference issues. Further, experience shows that testing “smart” technology to make sure it works as intended stands to be a lengthy, time-consuming process.

A. The Unlicensed Device Community Glosses Over Serious Interference Issues

The unlicensed device community has not advanced any technical solution to prevent harmful interference to licensed wireless microphones, despite the extensive

FCC record demonstrating that unlicensed devices will, in fact, cause such harmful interference. As Shure has emphasized, the wireless microphone case is particularly vexing, with no ready solution. Unlicensed device proponents also underestimate the potential for harmful interference to television reception. Congress cannot let the unlicensed device community's zeal to gain access to the "white spaces" substitute for sound engineering judgment and proven interference solutions.

Importantly, unlicensed device proponents acknowledge that before any new unlicensed devices could be deployed in the "white spaces," the devices would have to go through the FCC's certification process, through which the device manufacturer will have to demonstrate that the device meets the technical requirements set forth by the FCC for unlicensed device operation in the "white spaces." The precise FCC procedure is still uncertain because those technical requirements are a long way off. It will take the FCC, with the help of IEEE, substantial time to finalize those technical requirements because complex interference issues must first be resolved.

B. Other Attempts to Introduce "Smart" Technology Have Encountered Substantial Delays

On November 18, 2003, the FCC authorized use of DFS-equipped unlicensed devices in the 5 GHz band so long as they did not cause interference to the existing incumbent users—including Department of Defense (DOD) radar systems.¹⁴ The DOD, the National Telecommunications & Information Administration (NTIA) and the FCC (together, the "Coordinators") then initiated a joint testing effort to establish approval procedures for DFS-enabled unlicensed devices. Despite substantial efforts by the Coordinators, there have been many setbacks and, to date, there is still no published testing plan for unlicensed devices.

The original date for the submission of a final testing plan for devices capable of operating unlicensed in the 5 GHz band was January 17, 2005.¹⁵ On February 23, 2005, however, the FCC extended testing for the 5 GHz band for one year stating that "[t]he industry and the Federal Government have found the implementation of DFS to be more complex than originally envisioned."¹⁶ These delays have been caused by the very fundamental problem that "smart" technology is designed to solve—ensuring that DFS-equipped devices properly acknowledge occupied frequencies and do not transmit over them. Initial testing conducted by the Coordinators evidenced serious problems. Describing the performance of the initial devices the NTIA stated that "[o]verall, between all the manufacturers the radar detection capabilities of the devices tested were moderate at best and the radar detection was highly dependent upon the RF loading of the channel."¹⁷ Later tests resulted in the DFS-equipped devices not only detecting simulated DOD radar transmissions, but also falsely detecting "radar" transmissions emanating from other low powered unlicensed devices.¹⁸ This oversensitivity resulted in the DFS-equipped devices effectively disabling themselves during testing so as not to transmit over perceived higher priority signals. Further reports fail to clarify whether the Coordinators have been successful making the devices sensitive enough to detect radar and other priority transmissions without disabling themselves when other negligible radio frequency transmissions are detected. The FCC recently extended testing for another 180 days on February 16, 2006, stating that the "Commission, [NTIA], and the U-NII [unlicensed] equipment industry are continuing to work together to develop test procedures to ensure that DFS adequately protects most Federal Government radar systems. . . ."¹⁹

Significantly, this example shows the difficulty of implementing "smart" technology in what should be a relatively easy case—spectrum occupied primarily by a single high-powered incumbent. The "white spaces" present a much more complex problem because there are numerous incumbents in the band—both fixed and mobile—with widely divergent technical characteristics. An extensive testing effort will be required to ensure that unlicensed devices are capable of detecting and preventing interference to incumbent users.

VII. Concerns With Proposed Legislation

In light of these harmful interference issues and the lack of a proven technical solution, Shure has several concerns about moving forward with "white spaces" legislation. It is unclear whether there is adequate "white space" spectrum to support meaningful broadband deployment, particularly in urban areas. It is questionable whether a new strong wireless broadband competitor is likely to develop based on use of unlicensed spectrum. Finally, if Congress decides to proceed with "white spaces" legislation, specific amendments to the proposed bills are essential to protect existing services.

A. There Is Little “Open” Spectrum, Particularly in Urban Areas

Congress should be wary of claims that large amounts of “white space” spectrum exist. Shure’s professional wireless microphone users often have difficulty finding sufficient “white space” spectrum for large scale productions. Large events like the national political conventions or the Super Bowl have 300 or more wireless microphone and audio systems in simultaneous operation. These large productions already require more “open” television spectrum than is currently available. In addition, after the DTV transition, wireless microphones will have even less spectrum for their operations as they lose access to channels 52–69. This will exacerbate the congestion issues wireless microphones already experience. If wireless microphones have difficulty finding open spectrum for their operations, it calls into question how much spectrum will be available for unlicensed devices.

Moreover, low power television stations and TV translators are still in the process of being assigned their DTV channels, which will further crowd broadcast “white spaces.” Most of these allocations are expected to occur in rural areas, reducing the amount of open spectrum that will ultimately be available there.

Finally, Shure notes that spectrum utilization studies can be very subjective and may reach widely divergent conclusions regarding the amount of open spectrum in any given market. Consumers Union’s testimony cites large percentages of “unused” broadcast spectrum in various markets that presumably could be used to support unlicensed devices.²⁰ A TechWare, Inc. spectrum analysis, however, indicates there is substantially less spectrum available.²¹ Congress must carefully consider extravagant claims of unused broadcast spectrum.

B. Unlicensed Spectrum Is Not the Best Vehicle to Promote Broadband Deployment

Shure also questions whether allowing unlicensed devices in the “white spaces” is the best means to meet Congress’ goal of increasing broadband deployment, especially in light of the widespread interference unlicensed devices may cause to existing services. Regulating radio frequency bands under a “commons” (*i.e.*, unlicensed) regime historically results in an inefficient use of spectrum as a result of overcrowding and device interference (sometimes referred to as “the tragedy of the commons”). Past attempts to implement such a regime demonstrate how the results fall short of new unlicensed users’ expectations, and foreshadow potential harm to existing licensed users.

Experience demonstrates that allowing unlicensed access to spectrum results in overcrowding and the inevitable demand for more spectrum. Congestion at the unlicensed 900 MHz band resulted in the FCC opening the 2.4 GHz band for unlicensed use.²² Subsequently, crowding and interference in the 2.4 GHz band led the FCC to open 300 MHz in the U–NII 5 GHz band.²³ The proponents of an unlicensed regime argue that technological advances will allow unlicensed devices to share spectrum without causing unwanted interference, but current industry reports suggest that interference in unlicensed bands remains a problem that current and pending technological advances cannot overcome. For example, WiFi hotspots in the 2.4 GHz band can cause direct interference for other nearby hotspots.²⁴ What results is network unavailability, reduced network throughput, or occasionally, the network user inadvertently jumping between two competing hotspots.²⁵ These interference issues would be exacerbated in urban areas where there are few, if any, “white spaces,” and unlicensed devices would be forced to share a very small amount of spectrum.²⁶

These lessons of past unlicensed deployments call into question whether opening the “white spaces” to unlicensed devices will best promote broadband penetration. Further, there are no mandatory buildout obligations associated with unlicensed spectrum. If “white spaces” are opened nationwide, what is to keep companies from “cherry-picking” and serving only urban areas? Absent buildout requirements, areas which are unattractive economically to serve stand to remain unserved, even in an unlicensed regime. Thus, it is uncertain whether Congress’ goals will be met by pursuing an unlicensed allocation of this spectrum.

C. If Proposed Legislation Moves Forward, Important Amendments Are Needed to Protect Incumbent Services

If Congress concludes to move forward with “white spaces” legislation notwithstanding these concerns, additional safeguards are needed to protect incumbents. Although “white spaces” legislation is premised on unlicensed devices not causing interference to existing broadcast services,²⁷ additional protections are necessary to avoid the unintended consequence of unlicensed devices causing harmful interference to wireless microphones.

1. Wireless Microphones Are an Incumbent Broadcast Service That Is Entitled to Interference Protection

Both bills propose to protect “incumbent licensed services” from interference. Pursuant to Part 74 of the FCC’s rules, wireless microphones are authorized secondary users of the broadcast band.²⁸ Thus, they are an incumbent licensed service. Shure requests clarification that wireless microphones be included as an “incumbent licensed service” that is entitled to interference protection.

Further, S. 2332 directs the FCC to establish procedures to address complaints of harmful interference from licensed broadcast stations. As stated above, wireless microphones constitute licensed broadcast stations in the FCC’s broadcast auxiliary service. To the extent proposed legislation requires the FCC to address interference complaints only from certain classes of users, wireless microphone users must be entitled to have interference complaints heard at the FCC.²⁹

2. Unlicensed Devices Must Not Be Permitted Access to the “White Spaces” Until There Are Proven Interference Solutions

Both bills specify a 180-day deadline for the FCC to issue an order setting forth rules and procedures to open up the “white spaces” to unlicensed devices. Shure is concerned that this may be construed not only as a deadline for FCC action, but also as the date on which unlicensed devices are authorized to begin operations in the “white spaces.” It is critical that unlicensed devices not be permitted access to the “white spaces” until interference solutions are proven to protect all incumbent services.

At the hearing, both Senators Stevens and Allen emphasized their intent that unlicensed devices access “white spaces” on a non-interference basis to incumbent services. As Shure has emphasized throughout this testimony, there are no proven interference solutions. Solutions need to be tested and proven effective *before* the FCC can write rules and establish procedures that sufficiently protect incumbent services. Until testing is complete and a proven solution is developed, it will be impossible for the FCC to define such technical parameters. Moreover, given the complex technical issues before industry, it will take time to develop and finalize these parameters. Thus, the proposed bills should be amended to make clear that any deadline is a deadline for FCC action only, and not a date-certain for introduction of unlicensed devices to the “white spaces.” Further, the proposed bills should be amended to make clear that unlicensed devices will not be permitted access to the “white spaces” until technical solutions have been tested and proven effective to prevent interference to incumbent services, including wireless microphones.

3. The 180-Day Deadline for FCC Action Is Problematic

Both bills impose a 180-day deadline for FCC to issue a decision in its “white spaces” proceeding, ET Docket 04–186. Despite ongoing substantial efforts by interested companies, including in the important IEEE forum, to date, the 180-day deadline is not realistically achievable. Forcing the FCC to issue a decision before it has all the necessary technical information will not serve the public interest, risks severe interference consequences, and may ultimately slow the “white spaces” proceeding.

Without adequate, proven technical solutions, it will be impossible for the FCC to establish the technical rules for non-interfering unlicensed device operation. In light of the severe and widespread consequences of interference, technical experts must be afforded adequate time to test and prove their solutions effective.

As a result of the complex and time-consuming technical work still to be done, the FCC should be afforded additional time to issue a decision in the “white spaces” proceeding. It would be reasonable to afford the FCC at least 12–18 months to issue an order to ensure that the technical issues are fully considered.

4. FCC Must Be Afforded Discretion to Work Out the Technical Details of “White Spaces” Operation

Certain elements of the proposed bills are limiting and may unduly restrict the FCC as it considers an order in the “white spaces” proceeding. The FCC must be afforded discretion to define the technical parameters of “white space” operation. This discretion must include the ability to exclude certain channels in the “white spaces” from unlicensed devices. For example, public safety entities have advocated excluding public safety channels nationwide from unlicensed device operation. The current bills do not clearly afford the FCC the discretion to meet that request.

The FCC should also have the discretion whether to adopt specific rules regarding interference complaints. As the entity responsible for adjudicating such complaints—and given its overall responsibility for adjudicating interference complaints between spectrum users generally—it is best poised to define rules and procedures

for interference complaints in the context of the “white spaces.” The FCC should also retain the discretion whether to require certification or some other more rigorous process to ensure that unlicensed devices will not cause interference to other licensed services.

VIII. Conclusion

Introducing unlicensed devices to the “white spaces” presents complex interference issues with widespread and potentially devastating consequences for wireless microphones and other services relied upon by millions of Americans. Today, these interference issues are unresolved, but technical experts are actively seeking solutions. The American public deserves proven interference solutions, not theory and conjecture. The public interest would not be served by unlicensed devices that cause crippling interference to licensed services.

While the Committee’s goal to promote broadband deployment is an admirable one, it is critical that unlicensed devices not be allowed into the “white spaces” until real-world interference solutions are tested and proven effective. The key is preventing interference before it becomes an issue. It will take time to develop proven interference solutions, and the technical experts studying these issues should be able to do their job and get the interference solutions right. If a proposed solution doesn’t work, there is no way to remedy harmful interference after-the-fact—the damage is done. Real-world solutions are needed before the “white spaces” can reasonably be opened to unlicensed devices.

ENDNOTES

¹ *Unlicensed Operation in the TV Broadcast Bands*, ET Docket Nos. 04–186, 02–380, Notice of Proposed Rulemaking (released May 25, 2004) (“*NPRM*”).

² Indeed, the News, Sports and Entertainment Production Coalition stated that millions of Americans have come to rely on the high quality production in live news, sporting and entertainment events made possible by wireless microphones and described how the viewing public would be harmed if wireless microphone operations were impaired. See Letter to the Honorable Michael Powell from the News, Sports and Entertainment Production Coalition dated March 11, 2005 filed in ET Docket No. 04–186. The News, Sports and Entertainment Production Coalition includes the news branches of the major networks, the NFL, Major League Baseball, the NCAA, ESPN, Shure, and others.

³ Frequency coordination is mandatory for successful operation of large numbers of wireless microphones (such as a national political convention). If interference problems require even a single frequency change during an event, the entire frequency coordination plan may have to be re-done. Logistically, this may be impossible during a live performance.

⁴ See Comments of Pappas Telecasting Companies filed in ET Docket No. 04–186 on Nov. 30, 2004 at p. 7. See also Martin Statement on NOI (“I fear that these unlicensed devices will create additional interference problems when digital television gets underway. Interference already threatens to impede the introduction of digital television.”).

⁵ Letter to The Honorable Ted Stevens and The Honorable Daniel Inouye from David H. Arland et al. dated March 14, 2006 at p. 1 (“Consumer Electronics Letter”). Consumer electronics manufacturers Thomson Inc., LG Electronics USA, Inc. Hitachi Home Electronics (America) Inc., TTE Corporation, Samsung Electronics, Panasonic Corporation of North America, JVC Americas Corp., and Sony Electronics Inc. signed this letter.

⁶ *Id.* at 2.

⁷ *Id.*

⁸ See Separate Statement of Commissioner Kevin J. Martin, *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Bands*, ET Docket No. 02–380, Notice of Inquiry, rel. Dec. 11, 2002 at p. 1 (“Martin NOI Statement”) (“I fear that such unlicensed devices could interfere with the broadcast stations many rural viewers watch and that rural viewers would lose the few broadcast signals upon which they rely.”).

⁹ See Comments of National Translator Association filed in ET Docket No. 04–186 on Nov. 30, 2004 at p 2.

¹⁰ *NPRM*, at ¶ 35.

¹¹ *NPRM*, at ¶ 5.

¹² The experts at IEEE developed the standards used for operation of wireless LANs.

¹³ The issue of personal/portable unlicensed devices is beyond the scope of 802.22. This is because the interference cases presented by personal/portable unlicensed devices are even more complex than those presented by fixed unlicensed devices.

¹⁴See *Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz Band*, ET Docket No. 03-122, *Report and Order*, 18 FCC Rcd 24484 (2003) (“5 GHz Report and Order”). DFS-equipped devices were authorized to operate in 255 megahertz of spectrum between 5.470–5.725 GHz.

¹⁵See *5 GHz Report and Order* at p. 59.

¹⁶See *Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz band*, ET Docket No. 03-122, *Order*, 20 FCC Rcd 4883 at 4 (2005) (“5 GHz 2005 Delay Order”).

¹⁷See NTIA Institute for Telecommunications Sciences, U.S. Department of Commerce, *Development of Performance Testing Methods for Dynamic Frequency Selection (DFS) 5-GHz Wireless Access Systems (WAS)*, at pp. 1-17 (2005) (“NTIA Test Report”).

¹⁸See *NTIA Test Report* at pp. 16-18 (2005).

¹⁹See *Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz band*, ET Docket No. 03-122, *Order*, FCC 06-12 at 3 (2006) (“5 GHz 2006 Delay Order”).

²⁰Testimony of Jeannine Kenney, Consumers Union, before the United States Senate Committee on Commerce, Science and Transportation Hearing regarding Wireless Communications Issues & Spectrum Management Reform, Mar. 14, 2006, at p. 55.

²¹See Comments of MSTV, Inc. filed Nov. 30, 2004 in ET Docket No. 04-186 at Exhibit A pp. 14-20. The TechWare, Inc. spectrum study was commissioned by MSTV and shows virtually no channels available along the northeast corridor from Boston to Washington, D.C. Other urban areas show similar congestion, including Dallas, Southern Florida, San Francisco and Los Angeles.

²²See William J. Baumol, *Toward an Evolutionary Regime for Spectrum Governance: Licensing or Unrestricted Entry?* p. 11 (AEI-Brookings Joint Center for Regulatory Studies 2005).

²³*Id.*

²⁴*Id.* at p. 10.

²⁵*Id.*

²⁶Moreover, because there are relatively few, if any, channels open in the “white spaces,” unlicensed networks may have difficulty achieving the high data rates possible in spectrum above 1 GHz where there is much more bandwidth available for unlicensed applications.

²⁷Testimony of U.S. Senator Ted Stevens, United States Senate Committee on Commerce, Science and Transportation Hearing regarding Wireless Communications Issues & Spectrum Management Reform, Mar. 14, 2006 at p. 1 (“Senator Allen and I have proposed legislation that will allow unlicensed wireless devices to provide new services over the unused or “white spaces” of television broadcast spectrum, so long as such devices do not cause harmful interference to TV service.”).

²⁸47 CFR § 74.801 *et seq.*

²⁹Shure notes that it is very concerned about S. 2332’s directive to require field verification of interference as part of an FCC complaint adjudication. Given the potentially fleeting nature of interference, it may be impossible to replicate, and thus, may be impossible to get field verification. Lack of field verification should not preclude FCC consideration of an interference complaint. A preferable approach is for Congress to afford the FCC, as the expert agency, the discretion to fashion rules and procedures for interference complaints.

JOINT PREPARED STATEMENT OF JERRY ELLIG, PH.D., SENIOR RESEARCH FELLOW/
JERRY BRITO, J.D., LEGAL FELLOW, MERCATUS CENTER, GEORGE MASON UNIVERSITY

Mr. Chairman and Members of the Committee:

We appreciate the opportunity to enter written testimony into the record of the Committee’s hearing on spectrum policy reform. We are research fellows with the Mercatus Center, a 501(c)(3) research, educational, and outreach organization affiliated with George Mason University.¹

As part of the Mercatus Center’s ongoing program to assess the costs and outcomes associated with regulation, we recently examined the costs of major Federal telecommunications regulations. The attached paper examines the findings that are

¹This testimony reflects only the views of its authors and does not represent an official position of George Mason University.

most relevant to spectrum policy.² Out of all Federal telecommunications regulations, spectrum policy has by far the biggest effect on consumer welfare. Additionally, a second attached paper explores the efficiency of allocating spectrum for use as a “commons.”³

The costs of the current spectrum policy are large in an absolute sense—in the neighborhood of \$77 billion or more annually. Spectrum allocation is by far the costliest aspect of U.S. Federal telecommunications regulation, and it represents a very large share of the total. Even if the actual costs of U.S. spectrum allocation policy were only one-tenth the size that scholars estimate, they would still account for more than 20 percent of the total consumer cost of telecommunications regulation.

During the past two decades, U.S. spectrum policy has gradually become more market-oriented. Consumers have reaped significant benefits as a result. Nevertheless, current policy still generates large inefficiencies by preventing reallocation of spectrum to its most highly-valued uses—most likely wireless voice and data communications.

The costs of current spectrum allocation policy can be expected to fall sometime after 2006, if the FCC carries through on its plan to auction an additional 90 MHz of spectrum.⁴ However, the multi-billion dollar cost estimate should only be taken as a rough approximation of the negative effects of spectrum allocation policy on consumer welfare. A truly market-based approach would allow market transactions to allocate spectrum rather than licenses. Potential users could buy or lease spectrum, then choose how to use it. The amount of spectrum allocated to wireless telephone, broadcasting, broadband, and other services would be determined by market transactions and decisions of users, rather than regulatory proceedings. As Ronald Coase noted in 1959,

Certainly, it is not clear why we should have to rely on the Federal Communications Commission rather than the ordinary pricing mechanism to determine whether a particular frequency should be used by the police, or for a radio-telephone, or for a taxi service, or for an oil company for geophysical exploration, or by a motion-picture company to keep in touch with its film stars or for a broadcasting station. Indeed, the multiplicity of these varied uses would suggest that the advantages to be derived from relying on the pricing mechanism would be especially great in this case.⁵

A new school of academics and activists, however, has begun to challenge the spectrum property model. While they agree with Coase that command-and-control spectrum management is highly inefficient, they instead propose to make spectrum a “commons.” They claim that new spectrum sharing technologies allow a virtually unlimited number of persons to use the same spectrum without causing each other interference and that this eliminates the need for either property rights in, or government control of, spectrum.

Despite the rhetoric, the commons model that has been proposed in the legal and popular literature is not an alternative to command-and-control regulation, but in fact shares many of the same inefficiencies of that system. In order for a commons to be viable, someone must control the spectrum resource and set orderly sharing rules to govern its use. If the government is the controller of the commons—as many suggest it should be—then in allocating and managing the commons the government will very likely employ its existing inefficient processes.

Under market-based allocation, the FCC, courts, or another government body would still have a significant role in preventing signal interference, but they would not decide which bits of spectrum could be used for which purposes.

²Jerry Ellig, *The Economic Costs of Spectrum Misallocation: Evidence from the United States*, presented to the conference on Spectrum Policy in Guatemala and Latin America, Universidad Francisco Marroquin, Guatemala City, Guatemala, June 9–10, 2005, available at <http://cadep.ufm.edu.gt/telecom/lecturas/JerryEllig.pdf>. The attached paper has been retained in Committee files.

³Jerry Brito, *The Spectrum Commons in Theory and Practice*, Mercatus Center Working Paper in Regulatory Studies, March 2006, available at <http://www.mercatus.org/pdf/materials/1572.pdf>. The attached paper has been retained in Committee files.

⁴“FCC to Commence Spectrum Auction that will Provide American Consumers New Wireless Broadband Services,” FCC press release (Dec. 29, 2004), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-255802A1.pdf. The auction cannot occur until June 2006 because the Commercial Spectrum Enhancement Act of 2004 requires the FCC to notify the National Telecommunications and Information Administration at least 18 months prior to the auction of any frequencies mentioned in the legislation, so that any public sector users can be relocated to other spectrum.

⁵Ronald Coase, “The Federal Communications Commission,” *Journal of Law & Economics* 2 (1959): 16.

Given the documented tendency of economic research to under-estimate *ex ante* the cost-saving effects of deregulation and competition, the actual benefits of market-based spectrum allocation in the United States could be truly staggering. We hope these findings and the attached papers are useful to the Committee as it weighs various spectrum policy options.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN D. ROCKEFELLER IV,
TO CATHERINE W. SEIDEL

Cellphone Early Termination Fees

Many of my constituents are concerned about the practices of cell phone carriers that won't let them cancel their service without paying a termination fee of \$175 or \$200, even if they can't get a usable signal where they live. That makes it more difficult for people to switch carriers, which reduces consumer choice and ultimately keeps prices high. The Commission receives thousands of complaints on this subject every year. And I receive complaints from constituents about this. Consumers have banded together in some states (California, Florida, Illinois and South Carolina) to challenge this practice as a violation of state business law and consumer protection rules. I understand that the industry has asked the Commission to rule that Federal law preempts all of those challenges.

I think that this is a clear case where state laws that protect the public from unfair business practices should apply.

Question 1. Can you tell me the status of this proceeding at the FCC?

Answer. The Commission has initiated two proceedings in response to petitions for declaratory rulings that Early Termination Fees (ETFs) are "rates charged" under section 332(c)(3)(A) of the Communications Act, as amended. Both proceedings are currently under review. One involves litigation filed in South Carolina, *see* Wireless Telecommunications Bureau Seeks Comment on Petition for Declaratory Ruling Filed by SunCom, and Opposition and Cross Petition for Declaratory Ruling Filed by Debra Edwards, Seeking Determination of Whether State Law Claims Regarding Early Termination Fees are Subject to Preemption Under 47 U.S.C. Section 332(c)(3)(A), Public Notice, WT Docket No. 05-193, DA 05-1390 (rel. May 18, 2005) (SunCom Petition), and the other involves a petition filed by CTIA, *see* Wireless Telecommunications Bureau Seeks Comment on Petition for Declaratory Ruling Filed by CTIA Regarding Whether Early Termination Fees and "Rates Charged" within 47 U.S.C. Section 332(c)(3)(A), Public Notice, WT Docket No. 05-194, DA 05-1389 (rel. May 18, 2005) (CTIA Petition). Over 25,000 comments and reply comments have been received by the Commission in these proceedings.

Question 2. I understand that consumers are using state general purpose contract law to challenge the legality of these extremely high fees. Why would FCC policy preempt state law that is generally applicable to all businesses operating in a state? Does this mean that the FCC would preempt the right of wireless firms to enforce subscriber contracts in state court? Why is it fair to allow the companies to use state contract law but not to allow subscribers to use the same law?

Answer. These questions are raised in both the SunCom petition and the CTIA petition. The Commission will consider the arguments in the record, analyze the law and FCC precedent, and resolve these issues consistent with Section 332(c)(3)(A).

Question 3. I also understand that the wireless companies are arguing that these cancellation fees are actually part of the rate structure of the cellphone service. How can a fee that is charged after a customer has terminated their service be a fee for that service? That doesn't make any sense to me.

Answer. These questions are raised in the CTIA petition. The Commission will consider the arguments in the record, analyze the law and FCC precedent, and resolve the issues consistent with Section 332(c)(3)(A).

Question 4. I have heard the argument that the cancellation fee is meant to pay off the handset, which is generally offered free or at a discount along with a one or two year contract. Isn't \$175 a little high to pay off a \$100 handset to begin with? And, even if the handset costs \$175, if a customer terminates a two-year contract after one year, shouldn't the cancellation fee be cut in half?

Answer. The record in the SunCom and CTIA proceedings indicates that the costs of handsets vary, as do ETF charges. The record also indicates that the ETF practices of CMRS providers also vary. Most carriers charge flat ETFs, but some ETFs are prorated and decline over the term of the contract. One CMRS provider charges a flat ETF charge in some of its states and a prorated ETF charge in others. The question of whether an ETF is a rate charged is raised in both the SunCom and CTIA petitions.

MARCH 14, 2006

Hon. TED STEVENS,
Chairman,
Hon. DANIEL K. INOUE,
Co-Chairman,
Senate Committee on Commerce, Science, and Transportation,
Washington, DC.

Dear Chairman Stevens and Co-Chairman Inouye:

We, the undersigned digital television and set top box manufacturers, are writing to express our views on legislation pending before the Committee to authorize unlicensed wireless devices to utilize vacant television channel frequencies, in so-called "white spaces." We ask that our correspondence be made a part of the official record of the hearing held by the Senate Committee on Commerce, Science, and Transportation on March 14, 2006.

As manufacturers of digital television receivers and a wide range of consumer electronics products, we have a keen interest in this issue. On the one hand, we share the enthusiasm of the sponsors and co-sponsors of S. 2332 and S. 2327 about the potential of unlicensed wireless devices to enhance the communications experiences of many Americans and to facilitate the more ubiquitous deployment of broadband services. On the other hand, as companies that have participated in the creation and development of digital television, in some cases for more than 20 years, we are absolutely committed to ensuring that American consumers will be able to enjoy and benefit fully from the marvels of digital television technology which they have been promised by industry and the Congress.

We applaud the Congress for having established a hard deadline of February 17, 2009 for the conversion from analog to digital television (DTV) transmission and for creating a subsidy program that should lighten the burden of making that transition for households dependent on free, over-the-air broadcasting to receive their television programming. At this critical juncture in the migration to all digital television service, extraordinary care must be taken to ensure that government action does not inadvertently undermine the digital television conversion. The result of the legislative and regulatory process must be a win-win situation for both wireless unlicensed device operations and digital television service if American consumers are to reap the full benefits of our collective technological innovation.

As a matter of science and engineering, there is no question that the potential exists for interference from unlicensed wireless devices to the operation of digital television receivers and set top boxes. There exists a great deal of uncertainty about the operation of unlicensed wireless devices in vacant broadcast television spectrum. As a technical matter, we will be operating in uncharted waters. Unduly hasty action in establishing the rules and parameters for the operation of unlicensed devices could seriously disrupt the digital television transition for millions of Americans and taint the roll-out of unlicensed devices.

Accordingly, we believe that any legislation adopted by the Congress authorizing the use of "white spaces" for operation of unlicensed wireless devices must require that such operation not cause interference with television signals. Implementation of this non-interference requirement should require the Commission to make a specific finding to that effect, following appropriate testing. The burden of meeting the non-interference requirement should rest with the proponent of the unlicensed wireless product or technology seeking to use this spectrum. Artificial deadlines should not be imposed as they create heightened risk of approving unlicensed wireless device operation that could cause interference to television signals. Finally, as S. 2332 provides, channels 2 through 4 and 37 should not be available for unlicensed wireless device operations.

Notwithstanding the establishment of a hard date to complete the DTV transition, much work remains to ensure that our Nation gets it right. We accept our responsibility to help educate consumers about the transition and to provide them with abundant choices of product functionality and affordability. We urge the Congress to do nothing that would imperil or disrupt the DTV transition, including by the authorization of new services which would cause interference with television signals. We look forward to working with the Committee on all relevant legislation to complete a smooth and consumer-friendly conversion to digital television for all Americans.

Sincerely,

David H. Arland, Vice President, Communications and Government Affairs, Thomson Inc.

John Taylor, Vice President, Public Affairs and Communications, LG Electronics USA, Inc.

Paul Thomsen, Director, Design, Technology and Standards, Hitachi Home Electronics (America) Inc.

Richard Dinsmore, Vice President of Marketing, TTE Corporation.

John Godfrey, Vice President, Government and Public Affairs, Samsung Electronics America, Inc.

Peter Fannon, Vice President, Technology Policy, Government and Regulation, Panasonic Corporation of North America.

David Kline, General Manager, Strategic Product Planning, JVC Americas Corp.

Michael T. Williams, Executive Vice President, General Counsel/Secretary, Sony Electronics Inc.

