
SPECTRUM POLICY FOR THE 21ST CENTURY – THE PRESIDENT’S SPECTRUM POLICY INITIATIVE: REPORT 1

RECOMMENDATIONS OF THE FEDERAL GOVERNMENT
SPECTRUM TASK FORCE



U.S. DEPARTMENT OF COMMERCE
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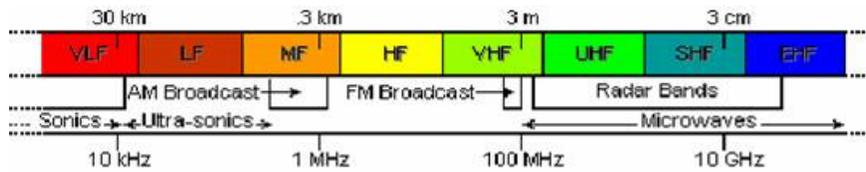
This report reflects the deliberations of the members of the Presidential Task Force and especially its Chair for the majority of this effort, Dr. Samuel Bodman, Deputy Secretary of Commerce from 2001 until April 2004. Their views reflect their strong interest in ensuring that they can accomplish their agencies' missions mandated by Congress, the President, and ultimately the American people, while doing their utmost to use valuable spectrum resources wisely and efficiently.

Further, the staff of the Presidential Task Force member agencies and especially the staff of the National Telecommunications and Information Administration have provided significant support to the discussion and many valuable comments on the various drafts of this report over the last year.

Members of the Presidential Task Force and its Working Level Group are listed in Appendix C.

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EXECUTIVE SUMMARY

PRESIDENT'S DIRECTION

In today's era of modern communications, radio frequency spectrum is critical. Just as steel, lumber, oil, and natural gas were key natural resources that supplied our economy in the 20th century, spectrum is increasingly important in the 21st century. Current spectrum management policies (administered by the National Telecommunication and Information Administration (NTIA) for federal government users and by the Federal Communications Commission (FCC) for all other users) are under increasing strain as the demand for existing spectrum-based services grows and new spectrum-related technologies and applications emerge. Recognizing this fact, the President established the "Spectrum Policy Initiative" (the "Initiative") to promote the development and implementation of a U.S. spectrum policy for the 21st century.

The recommendations proposed in this report build upon the recent experiences of the federal spectrum management community in its efforts to implement policies for three new technologies -- third generation (3G) wireless, Wireless Fidelity (WiFi) and Ultrawideband (UWB). Although these new technologies offer great potential economic and commercial benefits, before they could be introduced, critical federal government systems had to be protected. While ultimately successful, the effort to introduce these new technologies exposed limitations of our spectrum management system.

In March 2004, the President announced that all Americans should have universal, affordable access to broadband technology by 2007. Some of the most promising new

broadband technology is wireless. Expanding the amount of spectrum available for commercial uses will support high speed Internet access and therefore is integral to helping meet this goal.

To ensure that our spectrum management policies are capable of harnessing the potential of rapidly changing technologies, the President directed the Secretary of Commerce to conduct a comprehensive review to develop recommendations for improving spectrum management. The goal of the Initiative is to promote the development and implementation of a U.S. spectrum policy for the 21st century that will: foster economic growth; ensure our national and homeland security; maintain U.S. global leadership in communications technology; and satisfy other vital U.S. needs in areas such as public safety, scientific research, federal transportation infrastructure, and law enforcement.

Specifically, the President charged the Secretary of Commerce to prepare recommendations to:

- (a) facilitate a modernized and improved spectrum management system;
- (b) facilitate policy changes to create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process as it applies to incumbent users;
- (c) develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national security, homeland security, and public safety, and encouraging scientific research; and
- (d) develop means to address the critical spectrum needs of national security, home-

land security, public safety, federal transportation infrastructure, and science.

The President directed the Secretary of Commerce to initiate two courses of action:

(a) to establish a federal government Spectrum Task Force (the “Task Force”) consisting of the heads of impacted executive branch agencies, departments, and offices to address improvements in policies affecting spectrum use by federal agencies, and,

(b) to schedule a series of public meetings to address improvements in policies affecting spectrum use by state and local governments and the private sector, as well as improvements in policies for the spectrum management process as a whole.

The President further directed the Secretary of Commerce to prepare two separate reports containing the respective recommendations developed in the two courses of action. This report presents the recommendations of the Task Force. A companion report, which contains recommendations to address state, local, and private spectrum use, has also been prepared.

The following recommendations, drawn from input from the Task Force, propose changes to existing spectrum management policy to better meet future spectrum needs.¹

FACILITATE A MODERNIZED AND IMPROVED SPECTRUM MANAGEMENT SYSTEM

Recommendations

1. Consistent Methods for Assessing New Technologies

The FCC, NTIA, and other federal agencies should work cooperatively to standardize the methods required for evaluating spectrum efficiency and effectiveness with the under-

¹ Details describing these Recommendations and their genesis are provided in Section 3.

standing that appropriate metrics will vary by class of use and purpose.

2. Best Practices Handbook

NTIA should work cooperatively with other federal agencies and with input from the FCC to develop a best-practices handbook of analytical engineering spectrum tools and procedures. When complete, this handbook will include: a compilation of accepted technical standards, interference protection criteria, unwanted emission limits on both radio service and allocated band basis, and environmental characteristics (*e.g.*, noise levels). These technical standards will improve the ability of spectrum managers to evaluate the impact of new entrants into the spectrum and to protect incumbents. This handbook will also include a Terms of Reference Section to aid readers in understanding of terms such as “effectiveness” and “efficiency” in various contexts for different types of technology and different communication missions.

3. Application of Information Technology

NTIA should use its advanced information technology capabilities to modernize the existing paper-based processes and procedures associated with coordination of operations, assignment of frequencies and certification of new systems. These improvements should allow rapid development and implementation of more technically sound spectrum policy.

4. Adoption of a Career Development Program

The FCC and NTIA should jointly develop training programs for new spectrum management personnel in needed technical disciplines, and encourage private organiza-

tions and the federal agencies to ensure the continued competence of their frequency management organizations. NTIA and the FCC should explore training programs currently in use or in development by government agencies in other related fields of expertise, such as communications and information technologies. NTIA also should assist agency spectrum management organizations to improve their ability to perform their functions.

CREATE INCENTIVES FOR MORE EFFICIENT AND BENEFICIAL USE OF SPECTRUM AND POLICIES INCREASING PREDICTABILITY AND CERTAINTY FOR INCUMBENT SPECTRUM USERS

Recommendations

5. Capital Planning Process

To integrate spectrum resources more clearly into the capital planning process, the Office of Management and Budget (OMB) and NTIA should explore modifying and applying existing capital planning and investment control procedures to better identify associated spectrum requirements and costs of major investments. As part of the capital planning process, OMB and NTIA, together with the federal agencies, should explore modifying agencies' existing procedural and analytic guidelines for major spectrum dependent projects so that agencies give more consideration to spectrum use in their capital planning and management processes to determine the most cost-effective approach to obtaining radiocommunication services. This effort will improve the government's recognition of the opportunity costs and trade-offs of various telecommunications options in meeting operational requirements.

6. Technical Planning Process

To ensure that the federal government procures only the most effective and efficient technologies and systems, each federal agency that does not already do so should implement a formal process to evaluate their proposed needs for use of the spectrum before seeking spectrum certification from NTIA for new or improved radio systems. In particular, each agency should ensure that it is pursuing the most cost effective approach to obtaining its radiocommunication services, including the resource costs of spectrum. For example, agencies should consider procuring private sector radio services, commercial wireline services, use existing facilities operated by other agencies, and other approaches that may use less spectrum to meet their requirements. NTIA will review the agency analyses within its certification of spectrum support processes.

7. Use of Efficient Technologies for Effective Radiocommunication

To ensure that the current uses of radiocommunication systems are as efficient as possible and to develop new policies and plans for improvement as needed, NTIA should evaluate all spectrum use by the federal government over a five-year period to determine spectrum efficiency and effectiveness. The review should include spot compliance checks and signal measurement surveys to verify the accuracy of the records of the Government Master File (GMF), identify congestion and instances of duplicative operations that could be combined, and evaluate the utility of underutilized spectrum. NTIA should use the results of these reviews in the development of new and improved spectrum management policies, and the Federal Strategic Spectrum Plan. (See Recommendation 9)

8. Incentives For Use Of Efficient Radiocommunication Systems

NTIA, in coordination with the federal agencies, should initiate a plan to identify and implement incentives that promote more efficient and effective use of the spectrum. The plan should include development of methods or models to determine spectrum value. However, recognizing that market-based incentives may not be appropriate for all federal radio services and in all bands, NTIA should apply these incentives only in appropriate situations.

DEVELOP POLICY TOOLS TO STREAMLINE THE DEPLOYMENT OF NEW AND EXPANDED SERVICES AND TECHNOLOGIES WHILE PRESERVING NATIONAL AND HOMELAND SECURITY, AND PUBLIC SAFETY, AND ENCOURAGING SCIENTIFIC RESEARCH

Recommendations

9. National Strategic Spectrum Plan

A National Strategic Spectrum Plan should be developed. Each federal agency should provide biennially to NTIA a strategic spectrum plan, which NTIA would combine into a Federal Strategic Spectrum Plan. The FCC should also be encouraged to engage in long-range spectrum planning and to provide input into the federal planning process. Taken together, these two activities would produce the National Strategic Spectrum Plan, which may address: (1) new technologies or expanded services requiring spectrum, (2) the nature and characteristics of the new radiocommunication systems required, (3) the nature and characteristics of the spectrum required, and (4) suggested spectrum efficient

approaches to meeting the spectrum requirements. The National Strategic Spectrum Plan would be reviewed by the Policy and Planning Steering Group (see Recommendation 13) which would provide recommendations to NTIA on implementation of the plan.

10. Facilitation of Interoperability and Continuity of Government Communications

The Department of Homeland Security (DHS) and NTIA as well as the Office of Science and Technology Policy (OSTP) should coordinate with the Departments of Defense, Justice, Agriculture, and the Interior and other appropriate federal agencies and entities, including the FCC, to develop and implement a plan to address the spectrum needs of federal, state, and local communication interoperability and the continuity of government operations in light of continuing terrorist threats, emergencies, and day-to-day operations. This plan should complement the national strategy developed and articulated by DHS in coordination with the state and local stakeholders that own and operate most of the nation's public safety infrastructure and be integrated into the overall National Strategic Spectrum Plan.

11. Spectrum Sharing Innovation Test-Bed

The FCC and NTIA, in coordination with the federal agencies, should develop a plan to increase sharing of spectrum between federal government and non-federal government users. Within two years of this report's publication, NTIA and the FCC should establish a pilot program to allow for increased sharing between federal and non-federal users. NTIA and the FCC should each identify a segment of spectrum of equal bandwidth within their respective jurisdiction for this

program. Each segment should be approximately 10 MHz for assignment on a shared basis for federal and non-federal use. The spectrum to be identified for this pilot program could come from bands currently allocated on either an exclusive or shared basis. Two years after the inception of the pilot program, NTIA and the FCC should provide reports outlining the results and suggesting appropriate procedures for expanding the program as appropriate.

12. Characterization of New Technology and Expanded Services and Their Impact

The FCC and NTIA should work cooperatively to review existing analytical and measurement processes used to determine the impact of new technologies and expanded services on incumbents to reduce the time it takes to assess new uses of the spectrum. The results of the review would be published and augment the Best Practices Handbook. NTIA and the FCC should consider the development of a joint technical facility for characterizing new technologies and assessing their impact.

MEET CRITICAL SPECTRUM NEEDS: NATIONAL SECURITY, HOMELAND SECURITY, PUBLIC SAFETY, FEDERAL TRANSPORTATION INFRA- STRUCTURE, AND SCIENCE

Recommendations

13. Policy and Plans Steering Group (PPSG)

To formalize the coordination process and to ensure that national security, homeland security, public safety, federal transportation infrastructure, scientific research, and economic opportunity are taken fully into consid-

eration, the Assistant Secretary for Communications and Information should establish a Policy and Plans Steering Group (PPSG). The PPSG will consist of the Assistant Secretaries, or equivalent, with spectrum management oversight in agencies that are major stakeholders in the spectrum issues under consideration. The Assistant Secretary may invite any federal entity that is a stakeholder in the issues under consideration, including the FCC, to participate in the PPSG. The PPSG would provide advice to the Assistant Secretary on spectrum-dependent telecommunication policies, strategic plans, planned or revised positions on spectrum issues nationally and internationally, and help resolve major contentious spectrum policy issues that affect the use of spectrum by federal and non-federal users.

14. Policy Coordinating Committee (PCC)

As needed, the existing Policy Coordinating Committee (PCC) of the White House should be used to address spectrum-based radiocommunication issues that have not been resolved by the PPSG. The Assistant Secretary for Communications and Information, or a representative who is an Assistant Secretary or higher of an affected federal agency, may request PCC review of these issues. Such issues would include only those having a potentially significant impact on national security, homeland security, public safety, federal transportation infrastructure, scientific research, or economic opportunity. Further, NTIA should work with the FCC to revise Section IV (3) of their Memorandum of Understanding to append the following sentence, "For cases in which a White House Policy Coordinating Committee is convened, the Commission shall provide an additional minimum 15 business days for White House review."

15. Formalization of the Arrangement With the FCC Defense Commissioner

The Assistant Secretary for Communications and Information should work closely with the FCC's Defense Commissioner to ensure that the concerns of the agencies affected by national security, homeland security, public safety, and federal transportation infrastructure issues are considered fully in the course of NTIA and FCC proceedings. Further, this arrangement should be formalized by modifying the provisions of 47 C.F.R. § 0.181 to include the coordination of public safety activities as well as "national security, homeland security, and federal transportation infrastructure activities" as being within the purview of the Defense Commissioner.

Execution of Ongoing Spectrum Management Priorities

In support of the Initiative, NTIA will continue working towards efficient use of the spectrum through the following:

- 1) FCC/NTIA web-based coordination system development and implementation;
- 2) NTIA implementation of the Paperless Spectrum Management process;
- 3) FCC and NTIA monthly and biennial planning discussions as a result of the Memorandum of Understanding;
- 4) FCC and NTIA implementation of the agreement to relocate spectrum for advance wireless system use as per the Viability Assessment;
- 5) FCC and NTIA joint effort with the Department of State in reviewing and improving the World Radiocommunication Conference (WRC) process;
- 6) FCC and NTIA joint implementation of the results of the WRC 2003;
- 7) NTIA receiver standards study;
- 8) NTIA spectrum efficiency and effectiveness study;
- 9) NTIA interference criteria study;
- 10) NTIA compendium of innovative technologies for application to public safety; and
- 11) FCC and NTIA Rural Wireless Broadband report.

SECTION 1 – INTRODUCTION

BACKGROUND

The radio frequency spectrum is a limited natural resource of vital importance to the nation's economy and well-being.

Many industries that provide essential services to the American public are more dependent on the radio spectrum than they are on raw materials and other natural resources. Moreover, many industries that are not dependent on spectrum for their core business rely heavily on spectrum-dependent technologies to increase their productivity.

- Broadcasters access the spectrum for AM and FM radio stations, UHF and VHF television stations, and applications using satellites for direct broadcasting to the home.
- Mobile communication services in the private sector include citizen's band radio, maritime radios, cellular radios, paging systems, trunked radio systems, Personal Communication Systems, radios in commercial airplanes used for aeronautical radio-navigation and communications, and mobile-satellite communications and tracking systems.
- Wireline and media companies use spectrum-based systems for carrying voice, data, and video signals over long distances via microwave relay and satellite systems.

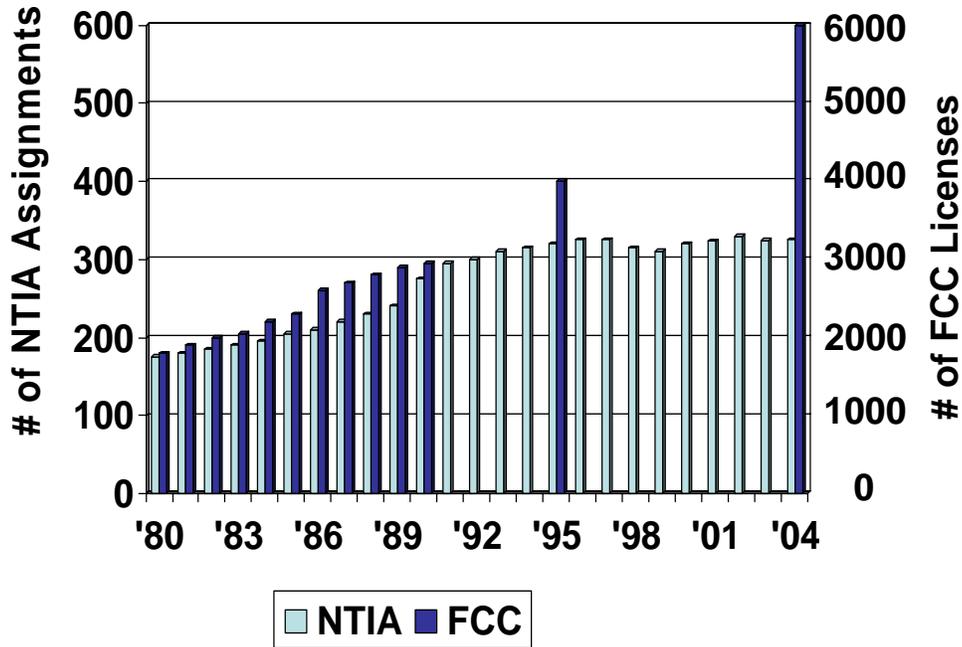
Likewise, spectrum use is essential to critical government functions ranging from defense and public safety to air traffic control and weather forecasting.

- The Department of Defense uses the spectrum extensively for aircraft command and control, mobile communication at

military bases and airfields, and long-distance communications using satellites.

- Federal law enforcement agencies (*e.g.*, Departments of Justice, the Treasury, the Interior, and Homeland Security) use the spectrum for command and control of their forces throughout the United States.
 - The Federal Aviation Administration (FAA) uses spectrum for safety services such as aeronautical radionavigation, precision-landing systems for all weather operations, surveillance, and air-to-ground communications.
 - The Department of Agriculture's Forest Service rangers use the spectrum every time they use their transportable radios for control of crowds or forest fires.
 - The Departments of Energy, the Interior, and the Army use the spectrum to transmit and receive control data to operate and protect federal dams and power grids.
 - The Department of Homeland Security uses the spectrum for the protection of the United States and for communications in disaster areas via emergency radio networks.
 - The National Aeronautics and Space Administration (NASA) uses the spectrum in virtually every aspect of satellite technology – launch, command, data collection, and landing.
 - The Department of Commerce's National Oceanic and Atmospheric Administration uses the spectrum to provide accurate and timely weather and water information, including forecasts and severe weather warnings.
 - The National Science Foundation supports research in radio astronomy and other scientific disciplines that requires that the nation's scientists have access to specific
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Figure 1. Number of Stations Authorized On January 1 Of Each Year



portions of the radio spectrum with regulatory protection from man-made radio interference.

The total amount of spectrum in use is hard to quantify, but some measures suggest large increases in demand over the past 15 years. For example, the number of active frequency assignments at both the FCC and NTIA has increased dramatically (See Figure 1). At the FCC, the number of licenses has almost quadrupled. At NTIA the number of assignments significantly increased by 1990 but has held constant since then. Further, radio systems are much more numerous today, due especially to the almost ubiquitous use of cellular telephones and other mobile devices and the use of unlicensed radios, such as garage door openers and remote alarm systems. Along with greater overall demand for spectrum, radio systems have also become more complex during this period. This change has

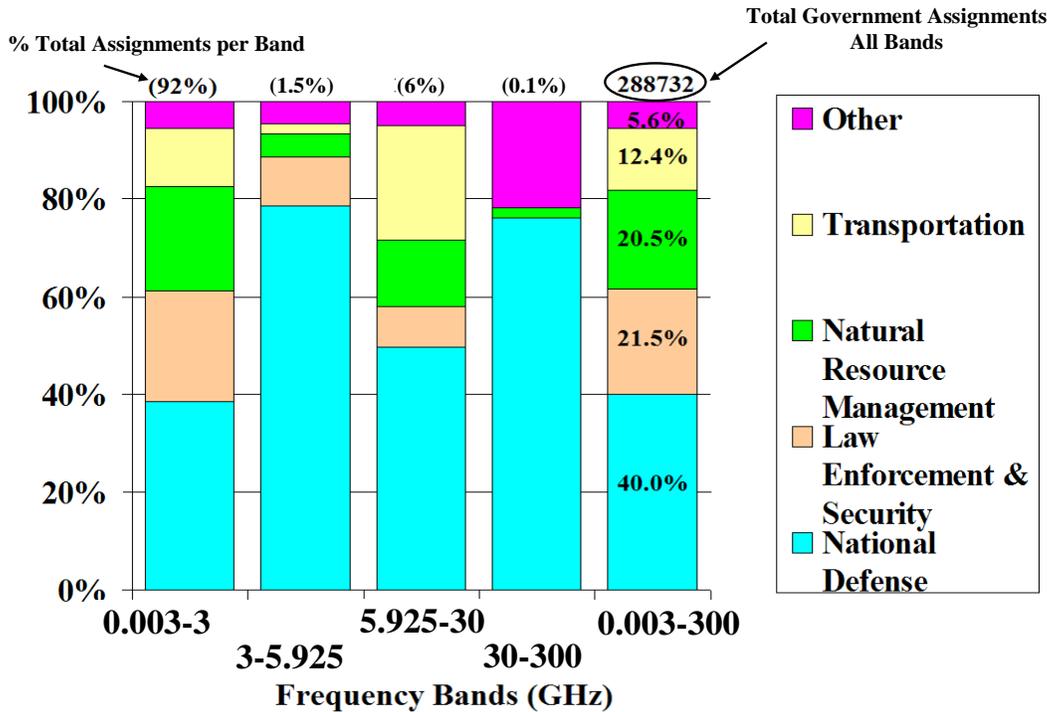
made the task of coordinating their use much more difficult.

U.S. policies must ensure that radio spectrum is used efficiently and fairly to promote the best interests of the public. Current spectrum management policies are under increasing strain as the demand for existing spectrum-based services grows and new spectrum-related technologies and applications emerge. The nation's spectrum policies must keep pace with new technologies and demands on the resources while ensuring that essential government missions are maintained.

HOW THE GOVERNMENT USES SPECTRUM

The federal government's spectrum use cuts across nearly all services and useful spectrum bands (see Figure 2). However, since technology limits most mobile voice communications to lower frequencies, almost 92 percent of the assignments authorizing govern-

Figure 2. Federal Government Spectrum Use



ment radio stations are below 3.1 gigahertz (GHz).

The federal government uses spectrum to provide public services that support safety of life and property, law enforcement, environmental management, and many other valuable social goods. The government should seek to act in an economically efficient manner, where the benefits of using the spectrum to provide those public goods are balanced with the benefits the spectrum could provide in non-federal uses. Consistent with this is the need for federal spectrum users to deploy the most cost effective technology, meaning that the use of spectrum resources by the technology is given due weight.

Almost every agency of the federal government uses the spectrum in performing mandated missions. Two dominant themes are present in the government's use of the radio spectrum:

1. Federal agencies require communications and/or measurement capabilities (*e.g.*, radar) to accomplish their missions.
2. The type of service required and the inescapable elements of time and space dictate the use of spectrum to satisfy these capability requirements.

One example of the use of radio technology is illustrated by a more detailed description of the FAA's role in air traffic control and public safety.

The mission of the FAA is to provide the safest, most efficient and responsive aviation system in the world for the benefit of the public. The FAA has developed and operated the National Airspace System (NAS) to accomplish this mission. To support the NAS, the FAA uses radio frequencies for communications, radionavigation, and surveillance (radar) systems. Over 50,000 radio frequencies are assigned for use at approximately 3,000 air-to-ground communications sites, 1,140 instrument landing facilities, over 1,000 VHF

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omnidirectional range sets, approximately 300 airport surveillance radars, 130 long-range air route surveillance stations, and 60 airport surface detection equipment radar stations. The NAS ensures the safety of nearly 200,000 registered private aircraft flying over 24 million hours per year; approximately 528 million passengers carried in air carrier and commuter aircraft; and nearly 23 million military flights to support our Nation's defense.

HOW THE SPECTRUM IS SHARED

The spectrum management model in use for the past century has segregated incompatible uses of the spectrum into separate bands. Different but compatible types of service often share the same spectrum bands. The regulators have allocated the majority of all spectrum for shared use between both federal government and non-federal government users, but both groups have exclusive access to some bands. Some shared bands allow significant interaction between government and non-government facilities. For example, federal radio facilities allow private sector ships and aircraft to communicate and navigate. Federal law enforcement agencies communicate with their state and local government counterparts. Federal electrical power systems interconnect with non-federal power systems, both domestic and international. Civil Air Patrol stations communicate with the military. Thus, the value of intercommunication among federal, state, and local governments, and private organizations has led regulators to recognize the need for increased spectrum access for all users.

While NTIA and the FCC manage their respective constituents' uses of the spectrum, both seek to serve the overall best interests of the public. The two spectrum managers have divided the usable radio spectrum (3 kHz-300 GHz) into about 800 frequency bands, and have allocated these bands to 34 radio services (*e.g.*, fixed, radionavigation, mobile,

broadcasting, and various satellite services). The allocation plan continues to change to meet evolving domestic and international spectrum needs.

Figure 3 shows that the total amount of spectrum allocated in the entire 3 kHz-300 GHz range to the federal government on an exclusive basis is 1.4 percent, 4.8 percent is allocated to the private sector on an exclusive basis, and 93.8 percent is allocated to the federal government and the private sector on a shared basis. In the range of valuable spectrum below 3.1 GHz, only 14.1 percent is allocated to the government on an exclusive basis, 31.7 percent is allocated for exclusive non-federal use, and 54.2 percent is allocated on a shared basis.

FEDERAL RADIO SYSTEM INVESTMENT

The federal government has a significant investment in spectrum-dependent infrastructure. Federal investment in selected bands below 3650 MHz alone totals about \$281 billion, as shown in Figure 4.² If federal operations need to relocate to other bands to accommodate private sector activities, this can involve significant capital investment costs. For example, in 1995 Congress ordered NTIA to reallocate 235 MHz of federal government spectrum to the private sector. This shift will cost taxpayers an estimated \$500 million to move the federal government users.

RECENT CHALLENGES

The recent experiences of the spectrum management community in its successful efforts to implement policies for three new technologies (third generation (3G) wireless,

² This figure is based on information that appears in NTIA Special Publication 95-32, *Spectrum Reallocation Final Report, Response to Title VI - Omnibus Budget Reconciliation Act of 1993* (1995), as adjusted for inflation.

Figure 3. Spectrum Allocations

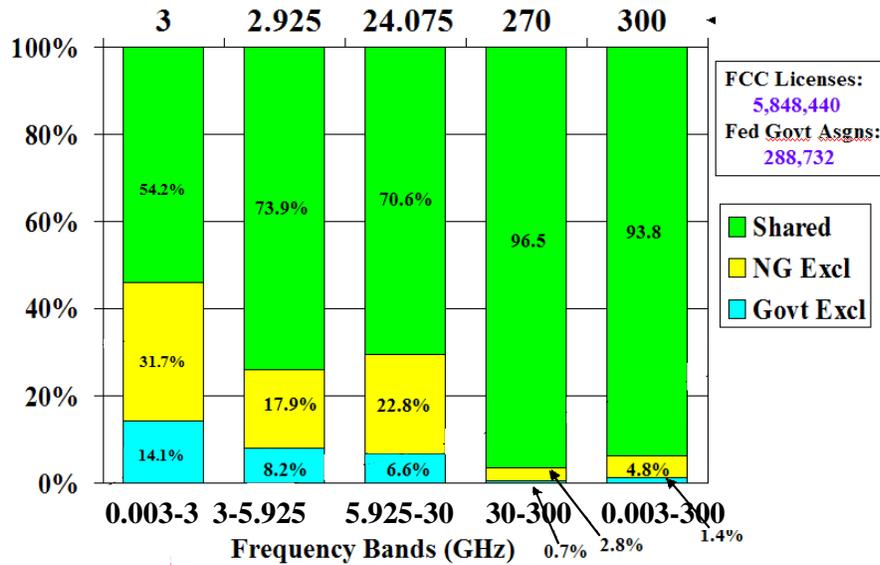
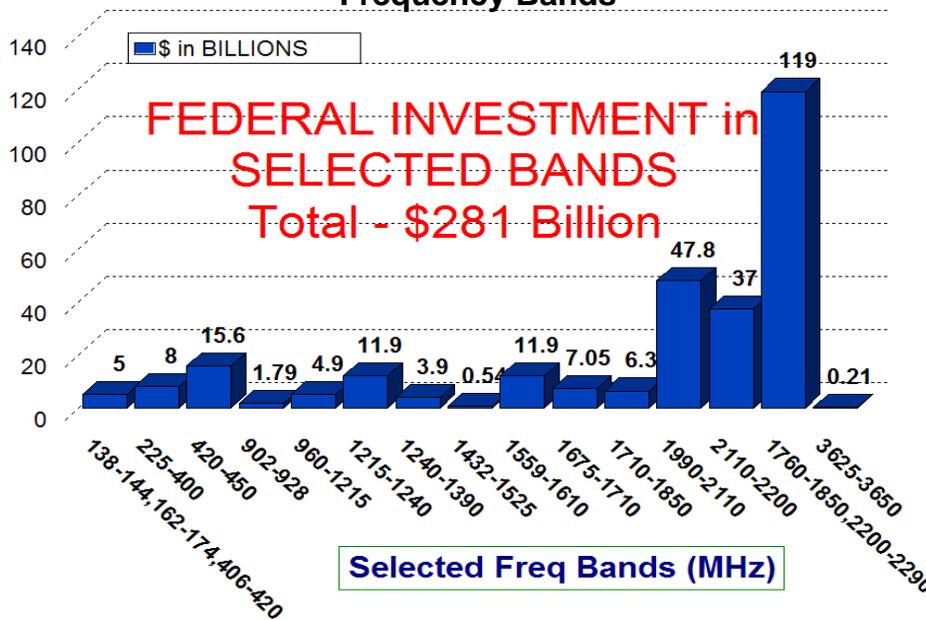


Figure 4. Federal Investment In Selected Frequency Bands



Wireless Fidelity (WiFi), and Ultrawideband (UWB)) illustrate the challenges posed by developing technologies to existing spectrum management procedures.

(1) In July 2002, NTIA released a plan in concert with the FCC and the DOD to make 90 MHz of spectrum available for 3G wireless

services, which could include broadband mobile services, while retaining DOD access to the same spectrum for critically important spectrum requirements at selected locations.

(2) In February 2002, NTIA worked closely with the FCC to authorize mechanisms to accommodate UWB wireless tech-

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nology without causing harmful interference to critical radio communications services.

(3) In February 2003, NTIA reached an agreement with the private sector and DOD on a technical solution that will permit unlicensed broadband services to share spectrum with government radar in the 5 GHz band.

The effort required to introduce these new technologies and services was substantial. However, the lessons learned from these experiences have laid the foundation for a spectrum management policy for the 21st century.

THE PRESIDENT'S SPECTRUM POLICY INITIATIVE

On May 29, 2003, the President signed a Presidential Memorandum outlining the Administration's initiative for spectrum management reform. The Memorandum stated that:

The existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use. Under the existing framework, the Government generally reviews every change in spectrum use, a process that is often slow and inflexible, and can discourage the introduction of new technology. Some spectrum users, including Government agencies, maintain that the existing spectrum process is insufficiently responsive to the need to protect current critical uses.³

The President stated that:

My Administration is committed to promoting the development and implementation of a U.S. spectrum policy for the 21st century that will: (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 re-

search, Federal transportation infrastructure, and law enforcement.⁴

To meet these goals, the President established the "Spectrum Policy Initiative." He directed the Secretary of Commerce to conduct a comprehensive review to identify recommendations for improving spectrum management policies and procedures for the federal government and to address state, local, and private spectrum use. The President charged the Secretary of Commerce with preparing recommendations to:

(a) facilitate a modernized and improved spectrum management system;

(b) facilitate policy changes to create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process as it applies to incumbent users;

(c) develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national security, homeland security, and public safety, and encouraging scientific research; and,

(d) develop means to address the critical spectrum needs of national security, homeland security, public safety, federal transportation infrastructure, and science.⁵

The Memorandum also established the federal government Spectrum Task Force (Task Force) to focus on improving spectrum management policies and procedures to stimulate more efficient and beneficial federal use of the spectrum. The Task Force members were the heads of the following executive branch departments, agencies, and offices:

- (1) Department of State;
- (2) Department of the Treasury;
- (3) Department of Defense;
- (4) Department of Justice;

³ See Memorandum for the Heads of Executive Departments and Agencies, *Spectrum Policy for the 21st Century*, 69 Fed. Reg. 1569 (Jan. 9, 2004).

⁴ *Id.*

⁵ *Id.*, at 1, 2.

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(5) Department of the Interior;
(6) Department of Agriculture;
(7) Department of Commerce;
(8) Department of Transportation;
(9) Department of Energy;
(10) Department of Homeland Security;
(11) National Aeronautics and Space Administration;
(12) Office of Management and Budget;
(13) Office of Science and Technology Policy;
(14) such other executive branch departments, agencies, or offices as the Chairman of the Task Force may designate; and
(15) subject to the authority of the Director, Office of Management and Budget, the Office of Project SAFECOM.⁶ The President also directed the Secretary of Commerce to hold a series of meetings to obtain the views of the public on these issues. The meetings were to help the Secretary develop recommendations for revising policies and procedures to promote more efficient and beneficial use of spectrum without harmful interference to critical incumbent users. Participants were to include spectrum users, equipment vendors, financial and industry analysts, economists, technologists, consumer groups, and interested federal, state, and local government agencies. Moreover, the President encouraged the FCC to participate and provide input to NTIA.

The Memorandum also required the Secretary of Commerce to prepare reports for the President with recommendations based on this comprehensive review process. This report conveys the recommendations of the Task Force.

WORK OF THE TASK FORCE

The Administration's Spectrum Policy Initiative Task Force, composed largely of

Deputy Secretary- and Assistant Secretary-level representatives of the 15 agencies directed to participate by the President, met five times between July 10, 2003 and March 11, 2004. The Task Force established a working group to conduct a preliminary analysis of the issues and to make initial recommendations to the Task Force. This working level group met thirteen times to consider the various options, to make recommendations, and to provide information for consideration by the Task Force. The Task Force provided its recommendations to the Chairman of the Task Force for use in the Secretary of Commerce's report to the President.

⁶ Project SAFECOM now resides under the Department of Homeland Security.

SECTION 2 – SPECTRUM MANAGEMENT IN THE UNITED STATES

BACKGROUND

The history of spectrum management is as old as the advent of radio communications. In 1906, the year when speech and music were first broadcast using radio, the first international radio conference was held. In the United States, widespread interference caused by unchecked transmission resulted in the Radio Act of 1912. The 1912 Act required the registration of transmitters with the Department of Commerce, but did not provide for the control of their frequencies, operating times, or station output powers. Thus, the 1912 Act was largely unsuccessful.

In 1922, U.S. government users of the spectrum gathered under the Secretary of Commerce to form the Interdepartment Radio Advisory Committee (IRAC) to coordinate U.S. Government use of the spectrum. The Government's use of the spectrum was more easily coordinated than the public's because the IRAC represented all federal users and such cooperation was mutually beneficial.

The Radio Act of 1927 established the Federal Radio Commission, which was shortly replaced by the FCC under the Communications Act of 1934 (the Act).⁷ The FCC is authorized to develop classes of radio service, allocate frequency bands to the various services, and authorize frequency use to non-federal users.

In addition, Section 305 of the Act preserves for the President the authority to assign frequencies to all federal government owned

and operated radio stations,⁸ as well as the authority to assign frequencies to foreign embassies in Washington, DC, and to regulate the characteristics and permissible uses of the government's radio equipment.⁹ The President has delegated these powers to the Assistant Secretary for Communications and Information who is also the Administrator of NTIA.¹⁰

As shown in Figure 5, the result of the Act is that spectrum management in the United States is split between NTIA and the FCC, with inputs from other agencies in certain circumstances. NTIA manages the federal government's use of the spectrum while the FCC manages all other uses. However, the Act does not mandate specific allocations of bands for exclusive federal, non-federal, or shared use; all such allocations stem from agreements between NTIA and the FCC.

U.S. SPECTRUM MANAGEMENT GOALS

Section 1 of the Act provides guidance regarding spectrum management objectives. It states that the FCC is to regulate:

so as to make available . . . a rapid, efficient, Nationwide, and worldwide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, [and] for the purpose of promoting safety of life and property. . . .¹¹

⁸ See 47 U.S.C. § 305(a).

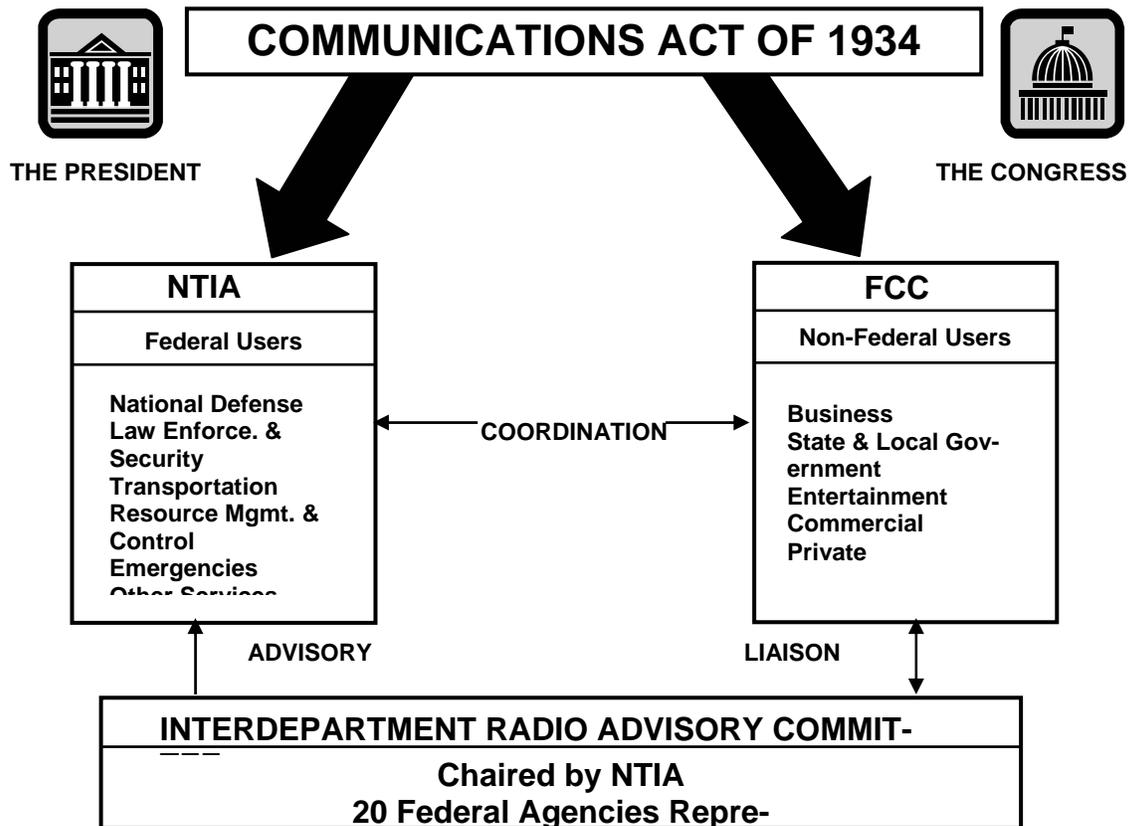
⁹ See 47 U.S.C. § 305(c)

¹⁰ See Section 103(b)(2) of the NTIA Organization Act (codified at 47 U.S.C. § 902(b)(2)); see also Executive Order 12046 (1978).

¹¹ See 47 U.S.C. § 151.

⁷ 47 U.S.C. § 151 *et seq.*

Figure 5. National Spectrum Management



Title III of the Act authorizes the FCC to regulate generally the “channels of radio transmission,” including the licensing and operation of radio stations.¹² Title III, however, provides few details on the FCC’s objectives for spectrum management. In general, the Act directs the FCC to act consistent with the “public interest, convenience, or necessity.”¹³ The “public interest” standard is the primary criterion for apportioning spectrum in the United States to non-federal users, although the Act mentions the goals of preventing interference among stations, promoting the efficient use of spectrum, and promoting public safety. The Act does not define “public interest,” but instead gives the FCC broad discre-

tion to elucidate and give specific content to the public interest standard.

NTIA is similarly charged with managing the federal government’s use of the radio spectrum in the public interest. The NTIA Organization Act requires the agency to:

“. . . foster full and efficient use of telecommunications resources, including effective use of the radio spectrum by the federal government in a manner that encourages the most beneficial uses thereof in the public interest.”¹⁴

NTIA interprets this mandate to encompass the overall benefits the American public derives from radio communication services, federal and non-federal, as well as the needs of various federal users and choices among competing users.

¹² See 47 U.S.C. § 301.

¹³ See e.g., 47 U.S.C. § 303.

¹⁴ See 47 U.S.C. § 901(c)(4)

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The FCC and NTIA jointly manage the nation's radio spectrum resources in the public interest. Both agencies are committed to performing their respective responsibilities in a cooperative, diligent, and professional manner to ensure that the spectrum is used for its highest and best purpose, whether by the private sector, state and local government, or federal agencies. The FCC and NTIA are required to work together to ensure that spectrum policy decisions promote efficient use of the spectrum consistent with both the economic interests and national security of the nation. To accomplish these goals, the Chairman of the FCC and the Assistant Secretary for Communications and Information signed a Memorandum of Understanding (MOU) in January 2003 that formalized their long-standing cooperative relationship.

Under the MOU, the Chairman of the FCC and the Assistant Secretary for Communications and Information agree to meet at least twice each calendar year to conduct joint spectrum planning. Further, they agree that their staffs will meet regularly to exchange information of mutual interest concerning spectrum management. Both agencies will give notice to each other of all proposed actions that could potentially cause interference to operations authorized by the other. Where possible, such notice will be given a minimum of 15 business days prior to final action for the other agency to comment. NTIA's Associate Administrator for Spectrum Management and the FCC's Chief of the Office of Engineering and Technology may agree to a different review period. Final action by the either agency, however, does not require approval of the other.

EXECUTIVE BRANCH ORGANIZATIONS

In addition to NTIA, several other Executive Branch agencies are heavily involved in some aspects of spectrum management. The Department of State (State Department) is

responsible for formulation, coordination, and oversight of foreign policy related to international communications and information policy. The Department of the Interior manages the use of the spectrum in the Trust Territories.

In addition, within the Executive Office of the President, the Office of Science and Technology Policy (OSTP) provides technical expertise and helps resolve differences between federal agencies, and develops communication support for continuity of operations of telecommunications for the federal government. (The Director of OSTP serves as the nation's telecommunications services manager during wartime settings, and performs other operational telecommunications functions during non-wartime emergencies.) The Office of Management and Budget (OMB) provides budgetary oversight and policy coordination with respect to federal spectrum matters. In addition to the involvement of OSTP and OMB, the staffs of the National Economic Council (NEC), the National Security Council (NSC), and the Homeland Security Council (HSC), who report to the President, have a role in reviewing national spectrum policy on national security, public safety, homeland security, and economic development. For example, with respect to 3G wireless technical study, the NSC and NEC used an existing telecommunications Policy Coordinating Committee to establish a process by which NTIA, in conjunction with the FCC and DOD, was tasked to examine the technical feasibility of making spectrum available for 3G wireless services. HSC reviews spectrum policy for its effects on first responders, interoperability, and telecommunications support of homeland security and emergency preparedness.

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THE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

Executive Order 12046 established NTIA in the Department of Commerce in 1978. Subsequently, Congress codified these functions in the National Telecommunications and Information Administration Organization Act.¹⁵ Among other responsibilities, NTIA is the principal telecommunications policy advisor to the President and the manager of federal government use of the spectrum. NTIA divides its responsibilities among five offices and four staff groups, which work together to investigate the changing field of telecommunications and develop appropriate Administration policies and regulations.

NTIA's authority in spectrum management policy is broad. The NTIA Organization Act provides NTIA with the authority to assign frequencies and approve the spectrum uses proposed for new federal government systems. Federal users must obtain frequency assignments before they can operate transmitters.

Pursuant to delegations from the President and the Secretary of Commerce, the Administrator of NTIA is the ultimate authority in all spectrum management decisions for the federal government, except frequency assignment decisions, which can be appealed to the OMB Director. The Administrator, in turn, has delegated the responsibility for day-to-day spectrum management decisions and for developing proposals for spectrum management policies to the Associate Administrator for NTIA's Office of Spectrum Management (OSM).

Some of the spectrum management work of OSM and NTIA involves classified radio-communication systems used by the DOD, DOE, DOJ, DHS, and others to support public safety and national defense missions. These systems, although they are a relatively small

proportion of the total number of federal government systems, (about 1% of all federal frequency assignments and 20% of all new radiocommunication systems reviewed by NTIA are classified) are of overwhelming importance to the safety and security of the United States. Because these systems are classified, NTIA may not be able to share pertinent spectrum management data with other users of the spectrum. However, OSM very carefully considers both the impact of new technologies and systems on the existing classified systems that must be protected and the economic needs of the industry and the people of the United States.

OSM formulates and establishes plans and policies that ensure the effective, efficient, and equitable use of the spectrum. To achieve this broad objective, OSM: develops long-range spectrum plans to meet future federal government spectrum requirements; develops plans for managing radio communications during emergencies; coordinates and registers federal government satellite networks internationally; satisfies the frequency assignment needs of the federal agencies; provides spectrum certification for new federal agency radio communication systems; performs the necessary engineering analysis for evaluating and planning spectrum use; and provides the necessary automated information technology capability to perform these activities.

Interdepartment Radio Advisory Committee (IRAC): The IRAC advises NTIA on the development of spectrum policy and procedural matters, develops federal government positions on international radio-treaty conference issues, and provides recommendations for conflict resolution.¹⁶ The IRAC is composed of the representatives of 20 federal

¹⁵ Public Law No. 102-538, 106 Stat. 3533 (1992) (codified at 47 U.S.C. § 901 et seq.).

¹⁶ Section 103(b)(2)(T) of the NTIA Organization Act enables the Secretary of Commerce to establish inter-agency advisory committees, such as the IRAC. *See* 47 U.S.C. § 902(b)(2)(T); *see also* 47 U.S.C. § 904(b), (c)(2).

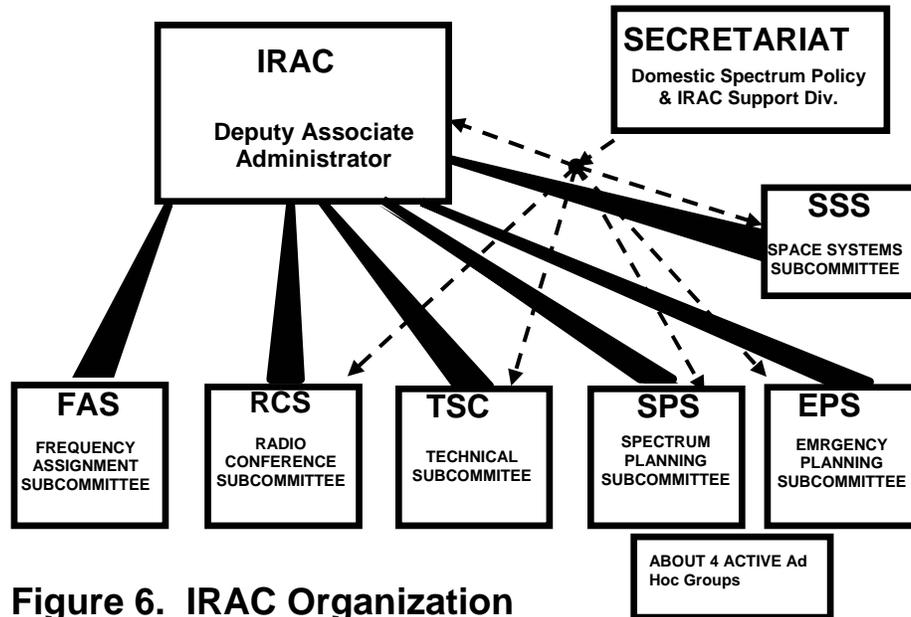


Figure 6. IRAC Organization

agencies and an FCC liaison. As shown in Figure 6, the IRAC has six subcommittees, which have representatives from the federal agencies, and are chaired by OSM staff, and four *ad hoc* groups that address various aspects of spectrum management policy. NTIA provides to the IRAC executive secretariat support and technical advice.

The IRAC Bylaws indicate that its primary function is to:

assist the Assistant Secretary for Communications and Information, through the Deputy Associate Administrator of OSM, in assigning frequencies to U.S. Government radio stations and in developing and executing policies, programs, procedures and technical criteria pertaining to the allocation, management, and use of the spectrum. The basic role of representatives appointed to serve on the IRAC shall be to function, when in Committee, in the interest of the United States as a whole.¹⁷

¹⁷ See, *NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management*, at ¶ 1.3.4 (May 2003 Edition, January 2004 Revisions).

In addition, the IRAC provides a mechanism for coordinating federal use of the spectrum and resolving interference conflicts among the federal agencies. NTIA may accept, reject, or modify the recommendations of the IRAC on agency proposals for new frequency assignments, new radiocommunication systems, and spectrum management issues of interest to their agencies.

Spectrum Management Decision-Making at NTIA: NTIA reaches its decisions by using the consensus advice from the IRAC, NTIA staff technical and policy analyses, and, when appropriate, public input.¹⁸ This allows each federal spectrum-using agency to review proposals for new radio services and stations from other federal users (and non-federal users in bands where regulatory jurisdiction is shared by NTIA and the FCC) to determine if

¹⁸ The FCC is a liaison member of the IRAC and is expected to represent the views of the FCC during IRAC policy debates. Further, since many bands are shared by both non-federal and federal users, the NTIA and FCC work closely to resolve potential conflicts resulting from policy initiatives.

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the new proposals will have an adverse impact on existing and planned operating systems. The affected users can then negotiate directly and develop a timely technical resolution to the potential problem. NTIA decisions are thus broadly debated with a strong emphasis on rational, technical, and analytic bases to provide maximum flexibility and support for the needs of new systems while protecting the rights of the existing users.

With regard to day-to-day authorization of radio stations and certification of new major federal systems, the decisions are made via technical review with agency comment and coordination. NTIA generally bases its decisions on the consensual advice of the agencies with technical review of the applications by NTIA staff. Routine authorization requests take 14 working days or less, while those requiring additional information and inter-agency coordination can take considerably longer. Certification of new systems takes about four to six months on the average, depending on the complexity of the system, the environment in which it will operate, the completeness of the application information, and the need for interagency coordination.

Technical Analyses: NTIA and the federal agencies have long relied on the use of engineering analyses and technical standards to select and authorize operating frequencies for radio stations of all types. These practices have taken the form of minimum standards for transmitters and receivers and the use of minimum separation criteria for siting systems as well as analyses of all potential interference interactions to ensure compatible operations. The U.S. Government uses complex computer databases and entry validation routines to screen proposals for conformance to appropriate standards and to ensure that users of systems potentially subject to interference are provided a chance to coordinate operations.

System Review Process and the Application of Information Technologies: As the spectrum has become more densely used over time, the technical rigor of the analyses and screening of new services has become increasingly complex. Since the U.S. Government uses radio frequencies for many different services over the entire range of the spectrum, any screening program must be sufficiently complex to consider all possible interactions between the various radio services. This analysis requires the ability to predict reliably propagation losses in all types of terrains and environments at all frequencies.

This system review process seeks to ensure that federal agencies procure only equipment that is in conformance with all applicable standards and capable of operating within the existing environment without causing or suffering interference. The system review process is needed partly because of the long lead times for the development and implementation of complex telecommunication systems and partly because of the rapid advances of telecommunications in general. The system review process was formalized by the OMB Circular A-11, which requires federal agencies to obtain certification from NTIA of spectrum availability before requesting funds for development or procurement of major systems.

The process has always used state-of-the-art interference analyses to assess proposals and has been successful in ensuring that deployed equipment would operate properly.

The analyses and approval process often requires four to six months for completion and resolution of problems. However, DOD and NTIA have begun developing improvements to Spectrum XXI, an advanced Windows-based, PC-oriented program that assists agencies in preparing information for both the spectrum certification and frequency assignment portions of the federal spectrum management process. Spectrum XXI should permit near instant approval of proposals in full

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conformance with all applicable federal regulations.

THE DEPARTMENT OF STATE

The State Department is involved in all international aspects of spectrum management including bilateral discussions with neighboring countries about operations of radio systems near the borders. Their role is to insure that the United States speaks with one voice and that all applicable precedents and treaties are followed. The State Department, along with NTIA and the FCC, oversees U.S. preparations for meetings of international telecommunications bodies, such as the International Telecommunication Union (ITU), and the Inter-American Telecommunications Commission (CITEL).

The State Department also prepares the U.S. Ambassador to head the U.S. delegation to the World Radiocommunication Conferences (WRCs) of the ITU, which occur every 3-4 years to update the International Radio Regulations, the treaty governing the cooperative use of the radio spectrum among member states. The State Department is responsible for beginning WRC preparations and, under the appointed ambassador, leads the U.S. delegation.

The International Telecommunication Advisory Committee (ITAC), a General Services Administration-chartered advisory committee under the Federal Advisory Committee Act, is central to the State Department's process for managing the U.S. preparations for international spectrum policy forums. The ITAC-Radiocommunication Activity (ITAC-R) process seeks to reconcile differences among various competing interests of federal and non-federal spectrum users in preparing the formal submissions by the United States to the ITU Radiocommunication Sector (ITU-R) or CITEL. The ITAC submits its recommendations to the State Department, which, in coordination with NTIA

and the FCC, determines the appropriate U.S. policy on the international telecommunications issues and forwards that determination to the ITU-R or CITEL as the formal United States submission.

National views and proposals on WRC agenda items are originated by NTIA and the FCC, and represent the potentially conflicting views of their constituents. The State Department presents the results of NTIA and FCC deliberations and negotiations internationally, and where necessary, assists in resolving conflicts. The ITAC-R develops technical inputs for the conference and submits them in a report to the WRC.

The State Department also initiates a "core delegation group" to lead the preparatory activities. The core delegation group is comprised of the U.S. WRC Head of Delegation, the vice-chairs, agency principals and representatives from the State Department, the FCC, NTIA, NASA, and DOD. The group assists in the development and implementation of U.S. goals and objectives, the development of U.S. policy positions, and the resolution of conflicts with U.S. proposals.

Finally, the State Department uses its worldwide network of embassies to garner support for U.S. positions and proposals. The Department of State's U.S. Mission in Geneva supports the U.S. delegation both before and during the conferences and meetings.

THE FEDERAL COMMUNICATIONS COMMISSION

The FCC is an independent federal regulatory agency established by the Communications Act of 1934. Its mission includes regulating interstate and international communications by radio, television, wire, satellite, and cable. Its jurisdiction covers the 50 states, the District of Columbia, and U.S. possessions.

The FCC staff is organized by function. There are currently six operating bureaus and ten staff offices. The bureaus' responsibilities

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include processing applications for licenses and other filings; analyzing complaints; conducting investigations; developing and implementing regulatory programs; and collecting information via public meetings and hearings. Bureaus have been delegated a significant level of responsibility to carry out the day-to-day authority and decisions of the FCC in their specific areas of telecommunications service. The offices provide technical and staff support services to all bureaus to ensure continuity. Even though the bureaus and offices have their individual functions, they regularly work together and share expertise in addressing FCC issues.

NTIA works closely with the spectrum management components of the FCC, which are found in the Office of Engineering and Technology (OET), the Wireless Telecommunications Bureau (WTB), the International Bureau (IB), and the Enforcement Bureau (EB). The spectrum management responsibilities of these groups are discussed below.

Office of Engineering and Technology (OET): The OET advises the FCC on technical and policy issues pertaining to wireless and wireline proceedings. In cooperation with other organizations in the FCC, the OET directs staff work with respect to general frequency allocation proceedings and other proceedings. In addition, the OET prepares recommendations for legislation, and reviews recommendations for rule changes and rule-making technical proposals initiated by other offices.

The OET also serves as the primary contact point between the spectrum management activity of NTIA and the FCC by maintaining a liaison with the IRAC.

The Wireless Telecommunications Bureau (WTB): The WTB handles all FCC domestic wireless telecommunications programs and policies -- except those involving satellite communications or broadcasting -- including

licensing and regulatory functions. Wireless communications services include cellular telephone, paging, personal communications services, public safety, and other commercial and private radio services. The WTB is also responsible for implementing the FCC's statutory authority to assign spectrum licenses by competitive bidding.

The goals of the WTB include fostering competition among different services; promoting universal service, public safety, and service to individuals with disabilities; maximizing efficient use of spectrum; developing a framework for analyzing market conditions for wireless services; minimizing regulation where appropriate; and facilitating innovative service and product offerings, particularly by small businesses and new entrants.

International Bureau (IB): The IB serves as the focal point within the FCC for cooperation and consultation on international telecommunications matters with other federal agencies, international or foreign organizations, and appropriate regulatory bodies and officials of foreign governments. The IB advises the Chairman and Commissioners on matters of international telecommunications policy. The IB develops, recommends, and administers policies, rules, and procedures for the authorization and regulation of international telecommunications facilities and services, and domestic and international satellite systems. The IB represents the FCC on international telecommunications matters at both domestic and international conferences and meetings, and directs and coordinates the FCC's preparation for such conferences and meetings.

The IB also manages the international coordination of spectrum allocations and frequency and orbital assignments to minimize cases of international radio interference involving U.S. licensees.

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Enforcement Bureau (EB): The EB is the primary organizational unit within the FCC responsible for enforcement of provisions of the Communications Act, FCC rules, FCC orders, and terms and conditions of station authorizations. Major areas of enforcement handled by the EB are: (1) consumer protection enforcement, (2) local competition enforcement, and (3) public safety/homeland security enforcement.

The EB investigates alleged violations of the FCC's technical, operational, and competitive rules, and recommends or issues appropriate enforcement actions. The bureau also adjudicates and mediates disputes between telecommunications industry entities.

The EB also enforces rules designed to protect safety of life, such as the Emergency Alert System, construction, marking and lighting of antenna structures and radiofrequency radiation.

Spectrum Management Decision-Making at the FCC: The FCC's day-to-day decisions in assigning frequencies and licensing stations are made in several different ways. The FCC will issue licenses directly to qualified appli-

cants when non-exclusive use of the spectrum is possible.

The FCC is required to use auctions to resolve mutually exclusive applications for initial licenses unless certain exemptions apply, including exemptions for public safety radio services, digital television licenses to replace analog licenses, and non-commercial educational and public broadcast stations.

In arriving at new policies, regulations, and procedures, the FCC generally reaches its decisions after public notice and comment proceedings. In some cases, the FCC will file a notice of inquiry to gain information for developing a new policy. However, when it has the information needed, the FCC, in a notice of proposed rulemaking, will propose specific procedures or policies for comment by the interested public. Parties affected by an FCC proposal may file formal documents commenting on the FCC's proposed actions and inquiries, as well as on the comments submitted by other affected parties.

The FCC reviews the material provided by the various commenters from technical, legal, and policy standpoints, and reaches a decision on whether to seek more information or to issue a new rule in an order.

SECTION 3 – RECOMMENDATIONS SOUGHT IN THE PRESIDENT’S MEMORANDUM: RECOMMENDATIONS OF THE AGENCIES

The following recommendations are based on the suggestions and comments of the Spectrum Task Force. These recommendations have been refined by the Department of Commerce and reviewed by agencies across the federal government.

FACILITATE A MODERNIZED AND IMPROVED SPECTRUM MANAGEMENT SYSTEM.

Reviewing the Rights and Responsibilities of Incumbents

The long-standing practice of spectrum management is to respect the rights of incumbent users. For example, new entrants generally are required to make any adjustments necessary to protect incumbent users. This practice implies that an incumbent user may continue to operate equipment that conforms to its authorization for the period of the authorization and that the user has a reasonable expectation of renewed authorization as long as the user remains in compliance with existing regulations. Any new users seeking authorization to operate on the same or adjacent channels have long been required to ensure that incumbent users will not experience harmful interference.

New technologies are now being developed that are designed to operate without causing interference to existing users on the

same frequencies. Proponents of these technologies assert (sometimes with limited technical substantiation) that they do not need to coordinate with existing users since they will not cause them interference. Incumbent users are then asked to prove harmful interference will occur so that operation of the new technology can be restricted.

To accommodate new technologies, while protecting incumbent users, a level of technical trust between the new users and the incumbents is important. It could ensure that the interference mitigation characteristics of new technologies are well understood. Similarly, consideration of whether incumbents have an obligation to deploy more robust equipment as they replace existing equipment may be appropriate.

Views of the Federal Agencies

Timeliness and Tools: There are several factors that contribute to the lengthy amount of time required to complete a new spectrum policy rulemaking. These factors include the lack of standard engineering tools, the absence of standard and agreed upon protection criteria, and insufficient knowledge of technical characteristics of new technologies. NTIA is working to shorten the time needed to issue new frequency assignments and to develop streamlined application processes.

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Staffing: The agencies want to ensure that as spectrum sharing and reallocation issues become more complex, staff are adequately trained to manage them. Since the early 1990s, new technologies have enabled spectrum users to be more efficient. Developing rules to accommodate new technologies requires advanced technical engineering. Meanwhile, retirements of experienced managers are accelerating. Limited formal training opportunities are available for new frequency managers.

The agencies are concerned that, as sharing and reallocation issues continue to become more complex and difficult to resolve, the appropriately-trained staff may not be available. Without technical training, the agencies are concerned that policymakers will have insufficient information upon which to base complex decisions.

Recommendations

1. Consistent Methods for Assessing New Technologies: The FCC, NTIA, and the federal agencies should work cooperatively to standardize the methods required for evaluation of spectrum efficiency and effectiveness with the understanding that appropriate metrics will vary by class of use and purpose.

2. Best Practices Handbook: NTIA should work cooperatively with other federal agencies and with input from the FCC to develop a best-practices handbook of analytical engineering spectrum tools and procedures. When complete, this handbook will include a compilation of accepted technical standards, interference protection criteria, unwanted emission limits on both radio service and allocated band basis, and environmental characteristics (e.g., noise levels). These technical standards will improve the ability of spectrum managers to evaluate the impact of new entrants into the spectrum and protection of incumbents. This handbook will also include a Terms of Reference Section to aid readers in

understanding terms such as “effectiveness” and “efficiency” in various contexts for different types of technology and different communication missions.

3. Application of Information Technology: NTIA should use its advanced information technology capabilities to modernize the existing paper-based processes and procedures associated with coordination of operations, assignment of frequencies and certification of new systems. These improvements should allow rapid development and implementation of more technically sound spectrum policy.

4. Adoption of Career Development Program: The FCC and NTIA should jointly develop training programs for new spectrum management personnel in the various applicable technical disciplines, and encourage private organizations and the federal agencies to ensure the continued competence of their frequency management organizations. NTIA and the FCC should also explore training programs currently in use or in development by government agencies in other related fields of expertise, such as communications and information technologies. NTIA should also assist spectrum management organizations in the agencies to improve their ability to perform their functions.

CREATE INCENTIVES FOR MORE EFFICIENT AND BENEFICIAL USE OF SPECTRUM AND POLICIES INCREASING PREDICTABILITY AND CERTAINTY FOR INCUMBENT SPECTRUM USERS

Effectiveness and Efficiency Today

Spectrum is a critical public resource. Efficient use of this resource must be one of the primary goals of spectrum management. Historically, federal users have been responsible for ensuring their own efficient spectrum use.

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As demand for spectrum has increased, NTIA and the FCC have begun to examine policies and regulations regarding the efficient use of the spectrum to ensure adequate spectrum for growth of existing services and new services.

NTIA's policy regarding efficient spectrum use is clearly stated in the NTIA Manual:

Consistent with NTIA goals to administer this resource wisely and stimulate the economic growth of the Nation, the national objectives for the use of the radio spectrum are to make effective, efficient, and prudent use of the spectrum in the best interest of the Nation, with care to conserve it for uses where other means of communication are not available or feasible.¹⁹

Although NTIA's spectrum management processes stress efficient and effective use of the spectrum, NTIA conducts limited oversight. It trusts each agency to ensure that their systems are the most spectrum efficient practicable. NTIA conducts general reviews of new systems and reviews agency performance in the normal frequency assignment coordination process. However, NTIA has generally left to agencies decisions regarding whether a system uses spectrum appropriately or whether needs can be satisfied using a commercial service or a non-spectrum technology

Land Mobile Efficiency: Within the land mobile service, NTIA has taken a more aggressive stand regarding spectrum efficiency. NTIA mandated narrowband technology and the use of trunking systems wherever possible. For other services, NTIA has developed rules for limiting "unwanted" emissions and occasionally output power, but not emission type or bandwidth. Emission types and bandwidth often link directly to system capabilities, security, and reliability and thus to the user's ability to complete the mission.

¹⁹ See NTIA Manual, at ¶ 2.1.

In addition, in October 1992, Congress by statute required NTIA to implement a plan for federal agencies with existing mobile radio systems to use technologies that are at least as spectrum efficient and cost effective as readily available commercial mobile radio systems.²⁰ NTIA submitted a plan to Congress in 1993 outlining the steps NTIA would take to ensure land mobile spectrum efficiency.²¹

These rules, developed with the advice of IRAC, covered all users of the primary federal mobile bands. They included a transition to narrowband or equivalent technology, effectively doubling the number of channels available for future use.

Federal agencies have been struggling through technology, budget, and operational issues in their attempts to implement these rules ever since, and unfortunately, many will not be able to meet the deadline.

In an effort to understand how the federal agencies are using the spectrum and how to improve their effectiveness, NTIA has begun a multi-phased study of spectrum efficiency and effectiveness within the federal land mobile bands. This study will explore the details of the primary federal land mobile bands in one geographic area, and may expand to other bands, areas, and services in follow-on studies. The study aims to determine improvements or changes to be made through new technologies, and spectrum management coordination and assignment practices, standards, and policies that would increase the efficiency of spectrum use to satisfy the future spectrum requirements of the federal government.

The Quest for Spectrum Efficiency: As technology develops and new services are introduced, the demand for spectrum for both

²⁰ See 47 U.S.C. § 903(d).

²¹ *Land Mobile Spectrum Efficiency: A Plan for Federal Government Agencies to use More Spectrum-Efficient Technologies*, U. S. Department of Commerce, NTIA, NTIA Report 93-300 (Oct. 1993).

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federal and non-federal systems increases. All sectors enjoy increased productivity and capability through the use of spectrum-dependent technologies. For federal agencies to continue to have access to spectrum to complete their missions, they seek to use the spectrum with maximum technical efficiency. Several recent events and reports have highlighted the issue of spectrum efficiency and offer some insight into current thinking and emerging initiatives concerning spectrum efficiency.

NTIA's Spectrum Summit in April 2002: NTIA convened a summit of federal and private-sector spectrum managers and radio service users and providers to determine whether spectrum will continue to be available to fulfill both current needs as well as those required for new technologies. The Summit concluded that additional spectrum to fulfill these needs could come from improved spectrum efficiency by current users through use of new technologies or creative assignment approaches, increased sharing, more realistic interference protection criteria, or some combination of these policy tools.

The FCC's Spectrum Policy Task Force in June 2002: The FCC's Task Force addressed a number of policy issues important to improving the way spectrum is managed, including "spectral efficiency." The FCC's Policy Task Force concluded that, due to differences in radio services, it was not feasible to select an objective and uniform measure of spectrum efficiency without unfairly disadvantaging a particular service.²² In its view, spectral efficiency is comprised of spectrum, technical, and economic aspects of the word "efficiency," making it difficult to compare unlike services and users. Likewise, the FCC Policy Task Force concluded that flexible use rules and transferability (e.g., secondary markets)

²² *Spectrum Policy Task Force Report*, ET Docket No. 02-135, FCC (Nov. 2002).

would promote economic efficiency in market-based services. In services where market forces are not evident, such as government use, it concluded that user fees could improve spectral efficiency.

General Accounting Office (GAO) Reports: In its September 2002 report, *Telecommunications: Better Coordination and Enhanced Accountability Needed to Improve Spectrum Management*, GAO found that the current structure of spectrum use in the United States may limit the development and use of some spectrum efficient technologies.²³ Federal agencies reported difficulties implementing NTIA initiatives, such as land mobile narrow banding. GAO recommended that NTIA and the FCC take actions to build more flexibility into the spectrum allocation system where feasible and to gain a better understanding of the current spectrum environment and spectrum efficient technologies to increase the use of these technologies.

In a June 11, 2002 report, *Telecommunications: History and Current Issues Related to Radio Spectrum Management*, GAO reported on how agency and industry officials explained the ways the federal government encourages efficient federal use of spectrum.²⁴ In findings similar to the previous report, GAO pointed out that NTIA is required by law to promote the efficient and cost-effective use of the spectrum it manages. The process by which NTIA certifies and authorizes spectrum is designed to promote efficiency, but the justification for spectrum use and review of current assignments is largely left to the individual agency. GAO found that, in many cases, the five-year review process, in which each agency is expected to

²³ *Telecommunications: Better Coordination and Enhanced Accountability Needed to Improve Spectrum Management*, GAO, GAO-02-906 (Sept. 2002).

²⁴ *Telecommunications: History and Current Issues Related to Radio Spectrum Management*, GAO, GAO-02-814T (June 11, 2002).

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review assignments every five years to ensure that they are actually used, is either not accomplished or overdue.

In a May 2004 report, *Spectrum Management: Better Knowledge Needed to Take Advantage of Technologies That May Improve Spectrum Efficiency*, GAO reported on federal agencies' investments in spectrum-efficient technologies and how the nation's spectrum management system may affect the development and adoption of these technologies.²⁵ GAO found that although federal agencies have made investment in spectrum-efficient technologies, these investments were made because the agencies had to meet specific mission requirements as opposed to systematic consideration of spectrum efficiency. GAO recommended that the NTIA Administrator establish guidance for agencies to determine and report their future spectrum requirements; strengthen the certification process to more directly address spectrum efficiency; and determine approaches for providing incentives to agencies to use spectrum more efficiently. GAO further recommended that the NTIA Administrator and the FCC Chairman jointly take steps to build in greater flexibility in the allocation system to facilitate emerging technologies; to gain a more thorough and on-going understanding of the current spectrum environment; and to develop jointly accepted models and methodologies to assess the impact of new technologies on overall spectrum use.

Views of the Federal Agencies

Spectrum Effectiveness and Efficiency: Federal agencies use the spectrum for a variety of communication services supporting their critical missions related to public safety, welfare of life and property, national defense, homeland security, and resource management.

²⁵ *Spectrum Management: Better Knowledge Needed to Take Advantage of Technologies That May Improve Spectrum Efficiency*, GAO-04-666 (May 2004).

Some of these services are met through publicly available service providers. Other critical government systems, however, require a level of specification and reliability that cannot be met by commercial service providers. Moreover, in order to assure the safety and welfare of life and property and the continued ability of federal agencies to perform their missions in an effective manner, these communication capabilities must expand to accommodate growth in current services and emerging services.

Although effective and efficient use of the spectrum has long been a goal of spectrum managers in both the FCC and NTIA, there are no agreed-upon tools for measuring either parameter. Where both federal and non-federal users employ a given technology, they are likely to have similar usage regulations and consequently have similar technical efficiency and effectiveness.

Usage concentrations can be a useful measure to compare the technical efficiencies of private-sector users. Some current government systems need a reserve of large numbers of channels for national security, emergency preparedness, and public safety missions, so usage concentration for those systems may necessarily be lower than those of commercial systems.

Commercial entities may have advantages in achieving greater efficiency because they can undertake cost effective technical improvements and recover their costs from customers. Government agencies may have less flexibility in budgeting and funding, even when investments in new technologies are cost effective.

Recommendations

5. Capital Planning Process: To integrate spectrum resources more clearly into the capital planning process, the Office of Management and Budget (OMB) and NTIA should explore modifying, as necessary, and

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applying existing capital planning and investment control procedures to better identify associated spectrum requirements and costs of major investments. As part of the capital planning process, OMB and NTIA, together with the federal agencies, should explore modifying agencies' existing procedural and analytic guidelines for major acquisitions, communications systems, or projects so that agencies give more consideration to spectrum use in their capital planning and management processes and pursue the most cost-effective approach to obtaining radiocommunication services. This effort will improve the government's recognition of the opportunity costs and trade-offs of various telecommunications options in meeting operational requirements.

6. Technical Planning Process: To ensure that the federal government procures only the most effective and efficient technologies and systems, each federal agency that does not already do so should implement a formal process to evaluate their proposed needs for use of the spectrum before seeking spectrum certification from NTIA for new or improved radio systems. In particular, each agency should ensure that it is pursuing the most cost effective approach to obtaining its radiocommunication services, including the resource costs of spectrum. For example, agencies should consider procuring private sector radio services, commercial wireline services, use existing facilities operated by other agencies and other approaches that may use less spectrum to meet their requirements. NTIA will review the agency analyses within its certification of spectrum support processes.

7. Use of Efficient Technologies for Effective Radiocommunication: To ensure that the current uses of radiocommunication systems are as efficient as possible and to develop new policies and plans for improvement as needed, NTIA should evaluate all spectrum use by the

federal government over a five-year period to determine spectrum efficiency and effectiveness. The review should include spot compliance checks and signal measurement surveys to verify the accuracy of the records of the Government Master File (GMF), identify congestion and identify instances of duplicative operations that could be combined, and evaluate underutilized spectrum. NTIA should use the results of these reviews in the development of new and improved spectrum management policies, and the Federal Strategic Spectrum Plan. (See Recommendation 9)

8. Incentives For Use Of Efficient Radiocommunication Systems: NTIA, in coordination with the federal agencies, should initiate a plan to identify and implement incentives that promote more efficient and effective use of the spectrum. The plan should include development of the methods or models to determine spectrum value. However, recognizing that market-based incentives may not be appropriate for all federal radio services and in all bands, NTIA should apply these incentives only in appropriate situations.

DEVELOP POLICY TOOLS TO STREAMLINE THE DEPLOYMENT OF NEW AND EXPANDED SERVICES AND TECHNOLOGIES WHILE PRESERV- ING NATIONAL AND HOMELAND SE- CURITY AND PUBLIC SAFETY, AND ENCOURAGING SCIENTIFIC RE- SEARCH

New Technologies

Non-Federal Sectors: Radio regulations attempt to ensure that radio services can operate compatibly without unacceptable levels of radio frequency interference. Thousands of jobs, increased economic productivity, and hundreds of billions of dollars of investment

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are contingent on the availability of spectrum for new technologies. When introducing new technologies, conflicts can occur with existing users that are operating in accordance with their authorization, who see no need to alter their operations. Recently there has been a notable increase in conflicts between emerging technologies and existing users of the spectrum.

In March 2004, the President announced that all Americans should have universal, affordable access to broadband technology by 2007. Making unlicensed and licensed spectrum available for broadband services and technologies is integral to helping meet this goal. The development of innovative wireless broadband technologies, such as WiFi and Wi-MAX will assist in meeting the President's 2007 goal.

Given the increase in new and innovative radio communication systems seeking access to the spectrum, the most challenging issue is interference problems inherent in using the latest technologies.

For non-federal government users to introduce a new technology, the FCC must first establish service rules (*e.g.*, power levels, adjacent band emission levels, and out-of-band emission levels) through a public rule-making process. NTIA, with the advice of the IRAC, develops recommendations to the FCC for the service rules that are necessary to prevent interference to federal radio communication systems. One of the major technical problems involves determining the potential interference impact to current and future federal radio communication systems. For new technologies that have a great deal of mobility or undefined applications and are likely to be ubiquitous, consistent predictions of interference are not possible without a set of agreed upon analysis conditions (*e.g.*, minimum separation distances, antenna coupling, propagation models, and aggregate versus single-entry interference interactions). Further complicating the problem is the height-

ened need to protect critical federal systems used for safety-of-life and public safety related applications.

Federal Sector: The federal government also introduces new types of radio systems into the environment. In the past, many of the systems were completely new applications of technology in new classes of radio service. Recently, however, the types of systems have been either commercial systems adapted to operation in spectrum allocated for federal use or of new types of technology operating in bands generally appropriate for the proposed service. Generally, new federal radio systems do not require reallocation of spectrum allocated to non-federal users. One factor that facilitates the introduction of new technology for federal users is that the federally allocated spectrum is allocated to very broad classes of spectrum, such as the mobile or radiolocation services, rather than to narrowly defined business services like the non-federal allocations. Thus, a new federal radar or mobile communications technology may have more flexibility in accessing the spectrum.

In the early 1970s, the IRAC and the Office of Telecommunication Policy, NTIA's predecessor agency, realized that the accommodation of new technologies would continue to become more complex and difficult. They established the Spectrum Planning Subcommittee (SPS) to review new federal radio communication systems and set up regulations in OMB Circular A-11 so that every federal agency developing a major radio communication system must obtain NTIA certification that the spectrum required by the system will be available when the system is ready for deployment. NTIA currently certifies spectrum availability for approximately 95 to 100 major, new federal radio communication systems valued at over \$2 billion annually. The SPS develops recommendations on behalf of the IRAC to NTIA/OSM regarding

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both agency requests for spectrum support for new systems and, as a larger mission, overall plans for use of the spectrum.

Even more significant perhaps is the lack of long-range spectrum planning at the national level. Neither the FCC nor NTIA engage in formal efforts to identify long-range needs for access to the spectrum and plan for their accommodation. NTIA, however, does engage in reviewing the short and mid-range needs of its constituents through its System Review process mentioned earlier. This process requires agencies to submit proposals for new radio communication at several times during their development and procurement life cycle to ensure that the new systems will be able to operate compatibly within the radio environment that will exist when they are deployed. Although this process could provide some guidance for mid-range (three to six-year) planning, it has not been formally used for long-term planning.

Longer-term planning for new radio technologies has proven very difficult because we do not have clear, established priorities for the use of the scarce spectrum resources, often because technology progresses rapidly in unanticipated directions. New technologies or applications seem to emerge with no warning even when the basic technology, like impulsive UWB systems, has been in existence since the beginning of radio. Moreover, they rapidly evolve from the initial technology, again like UWB, to embrace completely different methods that were not envisioned when the implementing rules were developed.

The unpredictable nature of American ingenuity is not to be solved - - it is a reality to be embraced if the United States is to retain its world-leadership in innovation. A formal and cyclical process will help us accommodate new technologies and changing use patterns.

Development of Rules for New Technologies:
The FCC and NTIA employ two different ap-

proaches in establishing service rules for new technologies.

Prior to authorizing a new radio system, NTIA staff provides a technical and policy review for consideration by the SPS. The staff reviews generally indicate any policy or interference problems that could arise. The agencies that share the spectrum with the applicant develop the recommendations of the SPS with advice from an FCC liaison member and NTIA staff assessment. Thus, the users of the spectrum solve problems directly before NTIA takes action.

On the other hand, the FCC uses a public proceeding to gather information from those concerned with the effects of the proposed new system. The proceeding often begins with the submission of the proponent's petition for rulemaking, which is placed on public notice for comment. The FCC staff reviews the comments and prepares either a Notice of Proposed Rulemaking or a Notice of Inquiry, which will contain staff assessments of the proposal, and seek comments on a number of rule options. Finally, upon review of the complete public record, the FCC will issue final rules on the new service.

While the NTIA process can be completed in six to twelve months, the FCC process can be longer.

Views of the Federal Agencies

Interoperability, Harmonization, and Continuity of Government: Federal agencies must rely upon NTIA to ensure that there is sufficient authorized spectrum to do the job. There is, however, no overarching telecommunication management system in place to address interoperability, harmonization, continuity of government operations through telecommunications, and economies of scale for the federal government. Moreover, there is no management system to ensure federal government interoperability with state and local public safety systems.

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New Spectrum Authorization Tools: NTIA, the FCC and DOD are working on new automated systems for certification and authorization. These systems incorporate features of the current Spectrum XXI System jointly developed by NTIA and DOD and NTIA's Federal Record Management System. DOD has also taken a lead role in defining requirements for a Global Electromagnetic Spectrum Information System (GEMSIS) to transform spectrum management. Some of the key attributes envisioned are:

- Improved Frequency Proposal Processing: Reduce the time necessary to process frequency proposals from days to hours/minutes. This will require the use of universally accepted robust algorithms, and procedural changes.
- Easy Access: Provide the users with ready access via the web, using a powerful (yet intuitive and user friendly) user interface. The system will include a robust help capability, as well as an interview type of capability to guide the inexperienced user through the process.
- Easy Data Transfer/Access: Data transfer will be transparent to the user. This will require common data definitions, data format standards, and the ability to search/sort/select/retrieve data.
- Security: Given the volume and sensitivity of stored data, this system must be designed with adequate safeguards and backup capabilities, and tiered access depending upon user needs.

Future Critical Needs: Access to the spectrum for new technologies, in both the federal and private sectors, will continue to be difficult in the absence of organized planning. NTIA, however, engages in reviewing the short and mid-range needs of its constituents through its system review process. These reviews assure the accommodation of specific systems developed by the government. However, long-range telecommunication and spec-

trum planning at the agency level either is absent or is not done to the specificity needed for radio communication planning.

NTIA and the FCC have not developed a strategic spectrum plan because of the lack of reliable data from most agencies and industry regarding their anticipated needs and developing technologies, as well as concerns for premature release of business plans. A balance must be found between providing agencies and industry with reliable, predictable spectrum environments that can sustain current and future uses and providing opportunities for technical and market-driven innovation.

Recommendations

9. National Strategic Spectrum Plan: A National Strategic Spectrum Plan should be developed. Each federal agency should provide biennially to NTIA a strategic spectrum plan, which NTIA would combine into a Federal Strategic Spectrum Plan. The FCC should also be encouraged to engage in long-range spectrum planning and to provide input into the federal planning process. Taken together, these two activities would produce the National Strategic Spectrum Plan, which may address: (1) new functions or expanded functions requiring spectrum, (2) the nature and characteristics of the new radiocommunication systems required, (3) the nature and characteristics of the spectrum required, and (4) suggested spectrum efficient approaches to meeting the spectrum requirements. The National Strategic Spectrum Plan would be reviewed by the Policy and Planning Steering Group (see Recommendation 13) which would provide recommendations to NTIA on implementation of the plan.

10. Facilitation of Interoperability and Continuity of Government Communications: The Department of Homeland Security (DHS) and NTIA as well as the Office of Science and Technology Policy (OSTP) should

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coordinate with the Departments of Defense, Justice, Agriculture, and the Interior and other appropriate federal agencies and entities, including the FCC, to develop and implement a plan to address the spectrum needs of federal, state, and local communication interoperability and the continuity of government operations in light of continuing terrorist threats, emergencies, and day-to-day operations. This plan should complement the national strategy developed and articulated by DHS in coordination with the state and local stakeholders that own and operate most of the nation's public safety infrastructure and be integrated into the overall National Strategic Spectrum Plan.

11. Spectrum Sharing Innovation Test-Bed: The FCC and NTIA, in coordination with the federal agencies, should develop a plan to increase sharing of spectrum between federal government and non-federal government users. Within two years of this report's publication, NTIA and the FCC should establish a pilot program to allow for increased sharing between federal and non-federal users. NTIA and the FCC should each identify a segment of spectrum of equal bandwidth within their respective jurisdiction for this program. Each segment should be approximately 10 MHz for assignment on a shared basis for federal and non-federal use. The spectrum to be identified for this pilot program could come from bands currently allocated on either an exclusive or shared basis. Two years after the inception of the pilot program, NTIA and the FCC should provide reports outlining the results and suggesting appropriate procedures for expanding the program as appropriate.

12. Characterization of New Technology and Expanded Services and Their Impact: The FCC and NTIA should work cooperatively to review existing analytical and measurement processes used to determine the

impact of new technologies and expanded services on incumbents to reduce the time it takes to assess new uses of the spectrum. The results of the review would be published and augment the Best Practices Handbook. NTIA and the FCC should consider the development of a joint technical facility for characterizing new technologies and assessing their impact.

MEET CRITICAL SPECTRUM NEEDS: NATIONAL SECURITY, HOMELAND SECURITY, PUBLIC SAFETY, FED- ERAL TRANSPORTATION INFRA- STRUCTURE, AND SCIENCE

Current Processes for Satisfying Critical Spectrum Needs

The critical spectrum needs of the federal government are coordinated and overseen by NTIA with the advice of the federal agencies via the IRAC and its subcommittees. NTIA authorizes radio station operations using the advice of the Frequency Assignment Subcommittee (FAS) of the IRAC. It has provided approximately 420,000 authorizations for operating telecommunication systems and processes between 6,000 and 8,000 frequency assignment actions every month. Although the events surrounding the September 11, 2001 terrorist attacks required massive amounts of emergency communications support, NTIA was able to meet all requirements by authorizing over 4,500 new stations in a very short period. However, processing under normal conditions and priorities still takes up to 14 working days, since each member agency must clear each authorization. The length of time needs to be shortened.

Views of the Federal Agencies

Loss of Bands Allocated For Federal Use: Over the last decade, there has been increased pressure on the federal government to transfer spectrum to non-federal government use.

Some of this pressure comes from industries seeking spectrum for new technologies and expanded services. Non-federal public safety also seeks increased allocations to alleviate congestion on crowded channels and introduce new, potentially life-saving technologies. While all of these alternative uses of the spectrum serve the public interest, the federal agencies want to ensure that their critical needs are fully appreciated, especially in comparison to nascent private-sector technologies.

Three recent cases that, while being successfully resolved through negotiation and compromise, raised difficult questions for the agencies and the spectrum management community that required new solutions include:

(a) NTIA and the federal agencies identified 255 MHz for transfer from exclusive federal government use to non-federal uses, with no compensation for sunk costs or for developing replacement strategies in response to Congressional mandates, between 1993 and 1997;

(b) NTIA and the federal agencies will relocate many vital federal government operations at great complexity to accommodate 3G wireless technology, albeit with full reimbursement; and

(c) NTIA and the federal agencies developed complex rules to permit the accommodation of UWB technology by overlaying low level signals on federal “restricted” bands, which had been reserved for science and critical public safety uses.

In these cases, acceptable results for both the private- and government- sector users were obtained. However, the agencies are concerned that the sharing and reallocation issues will continue to become more complex and difficult to resolve and that without the appropriate high-level technical and policy staff participation, the continued successful negotiations of such issues will remain difficult.

The Administration’s Role in National Spectrum Policy

In addition to the involvement of OSTP and OMB, the NEC, NSC, and HSC have roles in reviewing national spectrum policy for national security, public safety, homeland security, and economic development on a case-by-case basis. For example, with respect to the 3G wireless technical study, the NSC and NEC used an existing telecommunications Policy Coordinating Committee to establish a process by which NTIA in conjunction with the FCC and DOD were tasked to examine the technical feasibility of making spectrum available for 3G wireless services.

Recommendations

13. Policy and Plans Steering Group (PPSG): To formalize the coordination process and to ensure that national security, homeland security, public safety, federal transportation infrastructure, scientific research, and economic opportunity are taken fully into consideration, the Assistant Secretary for Communications and Information should establish a Policy and Plans Steering Group (PPSG) consisting of the Assistant Secretaries, or equivalent, with spectrum management oversight in agencies that are major stakeholders in the issues under consideration. The Assistant Secretary may invite any federal entity that is a stakeholder in the issues under consideration, including the FCC. The PPSG would provide advice to the Assistant Secretary on spectrum-dependent telecommunication policies, strategic plans, planned or revised positions on spectrum issues nationally and internationally, and help resolve major contentious spectrum policy issues that affect the use of spectrum by federal and non-federal users.

14. Policy Coordinating Committee (PCC): As needed, the existing Policy Coor-

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minating Committee (PCC) of the White House would be used to address spectrum-based radiocommunication issues that have not been resolved by the PPSG. The Assistant Secretary for Communications and Information, or a representative who is an Assistant Secretary or higher of an affected federal agency, may request PCC review of these issues. Such issues would include only those having a potentially significant impact on national security, homeland security, public safety, federal transportation infrastructure, scientific research, or economic opportunity. Further, NTIA should work with the FCC to revise Section IV (3) of their Memorandum of Understanding to append the following sentence, "For cases in which a White House Policy Coordinating Committee is convened, the Commission shall provide an additional minimum 15 business days for White House review."

15. Formalization of the arrangement with FCC Defense Commissioner: The Assistant Secretary for Communications and Information should work closely with the FCC's Defense Commissioner to ensure that the concerns of the agencies affected by national security, homeland security, public safety, and federal transportation infrastructure issues are considered fully in the course of NTIA and FCC proceedings. Further, this arrangement should be formalized by modifying the provisions of 47 C.F.R. § 0.181 to include the coordination of public safety activities as well as "national security, homeland security, and federal transportation infrastructure activities" as being within the purview of the Defense Commissioner.

Execution of Ongoing Spectrum Management Priorities

In support of the Initiative, NTIA will continue working towards efficient use of the spectrum through the following actions:

1) FCC/NTIA web-based coordination system development and implementation: NTIA is developing a web-based frequency coordination model for use in portions of the 70-95 GHz frequency range, which are shared by both federal and non-federal users. This model will virtually eliminate the paperwork and associated delays in the current process. The program will provide a means for federal and non-federal applicants to rapidly determine the need for detailed frequency coordination of new proposed assignments with existing federal assignments. The coordination model will provide a simple green light (detailed coordination not required) or yellow light (detailed coordination required) resulting in a virtually instantaneous coordination process in most instances. A user's application given a green light will be recorded as a temporary license valid for 60 days, pending receipt of additional data for a permanent license. The temporary license will be withdrawn if the additional data are not submitted timely. If a user's application is given a yellow light, the user must resubmit the application via the established IRAC/FCC coordination process or alter the application in such a way as to obtain agreement. The initial version of the program is planned for the third quarter of fiscal year 2004.

2) NTIA Paperless Spectrum Management Initiative: NTIA is reviewing the present spectrum management processes to make them more effective and efficient, especially through the application of information technology. This year, NTIA is supervising an outside systems contract to review these processes and make recommendations regarding the appropriate system architecture and an associated migration strategy and implementation plan. This initiative will provide a more rapid method for federal agencies to obtain spectrum to operate their radiocommunication systems. It will also provide a method for radiocommunication manufacturers to ensure that their systems meet federal spectrum

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standards and provide the federal agencies a means to obtain technical information on radio communications for planning spectrum use in the future.

3) *FCC and NTIA monthly and biennial planning discussions as a result of the Memorandum of Understanding*: The Memorandum of Understanding between NTIA and the FCC calls for regular meetings between the technical staffs of NTIA's OSM and the FCC's Office of Engineering and Technology as well as for twice-yearly meetings between the Assistant Secretary for Communications and Information and the FCC Chairman.²⁶ The participants may discuss issues of concern to the two agencies and in particular, the future spectrum requirements for public and private uses, including state and local government public safety agencies. They may also discuss the spectrum allocation actions necessary to accommodate new uses and the actions necessary to promote the efficient use of the spectrum as a means of increasing commercial access.

4) *FCC and NTIA implementation of the agreement to relocate spectrum for advance wireless system use as per the Viability Assessment*. Forty-five MHz of spectrum from the 1710-1755 MHz government fixed and mobile services band and a matching 45 MHz from the 2110-2170 MHz non-government band have been dedicated for 3G wireless applications. Federal agencies that operate systems that are required to relocate to accommodate 3G wireless are entitled to reimbursement, and are submitting planning assignments to the IRAC's Frequency Assignment Subcommittee for spectrum available in other bands. NTIA is now placing planning assignments in the Government Master File to ensure these agencies' spectrum requirements are met when they have received their reimbursement funds and can move.

5) *5) FCC and NTIA joint effort with the State Department in reviewing and improving the World Radiocommunication Conference (WRC) process*: WRCs are a major part of the international spectrum management process, culminating in a treaty conference every 3 to 4 years. Immediately following the recent WRC-2003, NTIA formed an interagency task force, consisting of members from the FCC, NTIA, and the State Department, to make recommendations on improving the U.S. preparatory process for WRCs. NTIA is issuing a report based on public and federal agency comments on the WRC process. A final phase of the project for 2004 will be to implement the recommendations for improvement.

6) *FCC and NTIA joint implementation of the results of the WRC 2003*: Immediately following the WRC-2003, NTIA, in cooperation with FCC and federal agencies, began implementing the results achieved at the conference. In September 2003, NTIA and FCC jointly released a schedule for completion of rulemakings that would modify relevant U.S. regulations incorporating the appropriate WRC changes. NTIA completed its recommendations for changes in February 2004 and the FCC has begun the necessary rulemakings to finish the job.

7) *NTIA receiver standards study*: To implement receiver standards where they would contribute improved spectrum efficiency, NTIA is broadly reviewing the current national and international status of receiver spectrum standards and exploring various alternatives and options to promote the use of more interference-robust receivers, especially in bands adjacent to bands in which high-power equipment is operated. NTIA expects to place revised receiver standards in the NTIA Manual by the first quarter of calendar year 2005. NTIA will also evaluate possible receiver standards for the private sector and share its conclusions with the FCC. In addition, NTIA will review the responses to the

²⁶ See 47 U.S.C. § 922.

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current FCC notice of inquiry on receiver standards and prepare NTIA's response to the FCC's draft notice of proposed rulemaking.

8) *NTIA spectrum efficiency and effectiveness study*: NTIA is developing improvements that could make the use of spectrum in the land mobile bands more efficient and effective by analyzing the federal government's use of the 162-174 MHz band land mobile radio service in the greater Washington, D.C./Baltimore area and making appropriate suggestions. NTIA is also evaluating the policy for distributing spectrum for federal land mobile use and land mobile standards to determine if the emission masks, receiver performance standards, and measurement procedures in the NTIA Manual should be updated. NTIA is also investigating alternative systems for completing the land mobile mission to determine potential advantages over existing systems. The initial results will be available by the third quarter of fiscal year 2004 and will provide appropriate recommendations to the Assistant Secretary for Communications and Information to revise the regulations for authorizing land mobile systems.

9) *NTIA interference criteria study*: NTIA is studying interference protection criteria (IPC) to better define and apply interference protection requirements for radio systems operating in the 30 MHz to 30 GHz frequency range. The need for such a study was recognized at NTIA's Spectrum Summit in April 2002, and in the report of the FCC's Spectrum Policy Task Force in October 2002. NTIA will compile and summarize established IPC in an initial report to be published in the third quarter of fiscal year 2004. In the second phase of the study, NTIA will define a general methodology for establishing IPC and apply it

to update, supplement, and validate IPC for each radio service in subsequent reports to be published starting in the fourth quarter of fiscal year 2004. The second phase report will also include a review of relevant federal government policies and recommendation of refinements, including consideration of incorporating IPC in the NTIA Manual and FCC rules.

10) *NTIA compendium of innovative technologies for application to public safety*: NTIA is preparing a comprehensive report on current and future technologies that meet the requirements for interoperable communications between public safety providers for completion by the end of fiscal year 2004. This will help ensure that first responders are properly equipped to prevent or minimize the effects of any future attacks by improving their ability to communicate with one another using all available communications resources via radio or wire.

11) *FCC and NTIA Rural Wireless Broadband report*: Using wireless is an important element for meeting rural needs for broadband, but there is not much spectrum in lower bands available for this purpose. This task will focus on the potential use of the 3650-3700 MHz band for rural applications. NTIA transferred this band to the FCC in 1996 with the stipulation that several federal uses of the band will continue at a few sites. This task will develop information on licensing considerations to protect the continued government operations in the band for use in the FCC rulemaking concerning this band. Completion of the report is expected in fall 2004.

**APPENDIX A – PRESIDENT'S
MEMORANDUM AND FACT
SHEET**

PRESIDENT'S MEMORANDUM AND FACT SHEET



For Immediate Release
Office of the Press Secretary
June 5, 2003

Presidential Memo on Spectrum Policy

Memorandum for the Heads of Executive Departments and Agencies

Subject: Spectrum Policy for the 21st Century

The radio frequency spectrum is a vital and limited national resource. Spectrum contributes to significant technological innovation, job creation, and economic growth, and it enables military operations, communications among first responders to natural disasters and terrorist attacks, and scientific discovery.

Recent years have witnessed an explosion of spectrum-based technologies and uses of wireless voice and data communications systems by businesses, consumers, and Government. Today there are over 140 million wireless phone customers and, increasingly, businesses and consumers are installing systems that use unlicensed spectrum to allow wireless data, called Wireless Fidelity (WiFi), on their premises. The federal government makes extensive use of spectrum for radars, communications, geolocation/navigation, space operations, and other national and homeland security needs. We must unlock the economic value and entrepreneurial potential of U.S. spectrum assets while ensuring that sufficient spectrum is available to support critical Government functions.

The existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use. Under the existing framework, the Government generally reviews every change in spectrum use, a process that is often slow and inflexible, and can discourage the introduction of new technology. Some spectrum users, including Government agencies, maintain that the existing spectrum process is insufficiently responsive to the need to protect current critical uses.

My Administration is committed to promoting the development and implementation of a U.S. spectrum policy for the 21st century that will: (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. My Administration has already proposed several legislative changes or program initiatives to improve elements of the spectrum management process. These proposals would greatly enhance the Government's ability to efficiently manage spectrum. To further promote the development and implementation of a U.S. spectrum policy for the 21st century, I hereby direct the following:

Section 1. Establishment. There is established the "Spectrum Policy Initiative" (the "Initiative") that shall consist of activities to develop recommendations for improving spectrum management policies and procedures for the federal government and to address State, local, and private spectrum use. The Secretary of Commerce shall chair and direct the work of the Initiative. The Initiative shall consist of two courses of spectrum-related activity: (a) an interagency task force that is created by section 3 of this memorandum; and (b) a series of public meetings consistent with section 4 of this memorandum. The interagency task force and the public meetings shall be convened under the auspices of the Department of Commerce and used by the Department to develop spectrum management reform proposals.

Sec. 2. Mission and Goals. The Initiative shall undertake a comprehensive review of spectrum management policies (including any relevant recommendations and findings of the study conducted pursuant to section 214 of the E-Government Act of 2002) with the objective of identifying recommendations for revising policies and procedures to promote more efficient and beneficial use of spectrum without harmful interference to critical incumbent users. The Department of Commerce shall prepare legislative and other recommendations to:

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- (a) facilitate a modernized and improved spectrum management system;
- (b) facilitate policy changes to create incentives for more efficient and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process as it applies to incumbent users;
- (c) develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national security, homeland security, and public safety, and encouraging scientific research; and
- (d) develop means to address the critical spectrum needs of national security, homeland security, public safety, Federal transportation infrastructure, and science.

Sec. 3. federal government Spectrum Task Force. There is hereby established the federal government Spectrum Task Force (the "Task Force") to focus on improving spectrum management policies and procedures to stimulate more efficient and beneficial use of Government spectrum. The Secretary of Commerce, or the Secretary's designee under this section, shall serve as Chairman of the Task Force.

(a) Membership of the Task Force. The Task Force shall consist exclusively of the heads of the executive branch departments, agencies, and offices listed below:

- (1) the Department of State;
- (2) the Department of the Treasury;
- (3) the Department of Defense;
- (4) the Department of Justice;
- (5) the Department of the Interior;
- (6) the Department of Agriculture;
- (7) the Department of Commerce;
- (8) the Department of Transportation;
- (9) the Department of Energy;
- (10) the Department of Homeland Security;
- (11) the National Aeronautics and Space Administration;
- (12) the Office of Management and Budget;
- (13) the Office of Science and Technology Policy;
- (14) such other executive branch departments, agencies, or offices as the Chairman of the Task Force may designate; and
- (15) subject to the authority of the Director of the Office of Management and Budget, the Office of Project SAFECOM.

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A member of the Task Force may designate, to perform the Task Force functions of the member, any person who is a part of the member's department, agency, or office, and who is a full-time officer or employee of the federal government.

(b) Functions of the Task Force. The functions of the Task Force are advisory and shall include, but are not limited to, producing a detailed set of recommendations for improving spectrum management policies and procedures to stimulate more efficient and beneficial use of spectrum by the federal government. The recommendations shall be consistent with the objectives set out in section 2 of this memorandum. The Task Force may hold meetings to obtain information and advice concerning spectrum policy from individuals in a manner that seeks their individual advice and does not involve collective judgment or consensus advice or deliberation. At the direction of the Chairman, the Task Force may establish subgroups consisting exclusively of Task Force members or their designees under this section, as appropriate.

Sec. 4. Recommendations to Address State, Local, and Private Spectrum Use. Consistent with the objectives set out in section 2 of this memorandum, the Department of Commerce, separately from the Task Force process, shall, in accordance with applicable law, conduct public meetings that will assist with that Department's development of a detailed set of recommendations for improving policies and procedures for use of spectrum by State and local governments and the private sector, as well as the spectrum management process as a whole. These meetings will involve public events to provide an opportunity for the input of the communications industry and other interested parties. Participants may include spectrum users, wireless equipment vendors, financial and industry analysts, economists, technologists, and consumer groups. Interested Federal, State, and local government agencies will be welcome to attend and participate. The Federal Communications Commission is also encouraged to participate in these activities and to provide input to the National Telecommunications and Information Administration at the Department of Commerce on these issues.

Sec. 5. Reports. The Secretary of Commerce, or the Secretary's designee, shall present to me, through the Assistant to the President for Economic Policy and Director of the National Economic Council and the Assistant to the President for National Security Affairs, in consultation with the Assistant to the President for Homeland Security, two separate reports no later than 1 year from the date of this memorandum, one of which shall contain recommendations developed under section 3 of this memorandum by the Task Force and the other containing recommendations developed under section 4.

Sec. 6. General Provisions.

(a) The heads of federal government departments and agencies shall assist the Chairman of the Task Force established by section 3 and provide information to the Task Force consistent with applicable law as may be necessary to carry out the functions of the Task Force. Each Federal department and agency shall bear its own expense for participating in the Task Force. To the extent permitted by law and within existing appropriations, the Department of Commerce shall provide funding and administrative support for the Task Force.

(b) Nothing in this memorandum shall be construed to impair or otherwise affect the functions of the Director of the Office of Management and Budget relating to budget, administrative, or legislative proposals.

Sec. 7. Judicial Review. This memorandum is intended only to improve the internal management of the federal government and is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its departments, agencies, instrumentalities or entities, its officers or employees, or any other person. Sec. 8. Publication. The Secretary of Commerce is authorized and directed to publish this memorandum in the Federal Register.

GEORGE W. BUSH

PRESIDENT'S MEMORANDUM AND FACT SHEET



For Immediate Release
June 5, 2003

Fact Sheet on Spectrum Management

Taking Action to Improve Spectrum Management

Presidential Action

- President Bush signed an Executive Memorandum creating the Spectrum Policy Initiative to develop recommendations for improving spectrum management policies and procedures.
- The Department of Commerce will chair the Initiative.
- The purpose of the Initiative is to promote the development and implementation of a U.S. spectrum policy that will foster economic growth; ensure our national and homeland security; maintain U.S. global leadership in communications technology development and services; and satisfy other vital U.S. needs in areas such as public safety, scientific research, federal transportation infrastructure, and law enforcement.
- The existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use. The Spectrum Initiative will help develop a U.S. spectrum policy for the 21st century.

The Importance of Spectrum

- Spectrum contributes to significant innovation, job creation, and economic growth. It is vital to scientific discovery and technological advances. It is critical to the ability of first responders to react to natural disasters and terrorist attacks and essential to the military's ability to fulfill its mission of protecting our nation.
- Recent years have witnessed enormous growth in spectrum-based technologies and uses of wireless voice and data communications systems by businesses, consumers, and government. Today, there are more than 140 million wireless phone customers and, increasingly, businesses and consumers are installing WiFi systems to allow wireless computing on their premises.
- The federal government makes extensive use of spectrum for radars, communications, geolocation/navigation, space operations, and other national and homeland security priorities.

How the Initiative Will Work

- The Initiative is comprised of two activities:
 1. The Federal Spectrum Task Force will produce a set of recommendations for improving spectrum management policies and procedures to increase the efficiency and beneficial use of spectrum by the federal government.
 2. The Department of Commerce will hold a series of public meetings to assist in its development of a set of recommendations for improving policies and procedures for use of spectrum by state and local governments and the private sector.
- Within one year, the Secretary of Commerce will provide the President recommendations to:
 - Facilitate a modernized and improved spectrum management system;
 - Facilitate policy changes to create incentives to increase the efficiency and beneficial use of spectrum and to provide a higher degree of predictability and certainty in the spectrum management process;

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- Develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national security, homeland security, public safety, and encouraging scientific research; and
- Develop means to address the critical spectrum needs of national security, homeland security, public safety, federal transportation infrastructure, and science.

Building on a Foundation of Success

While the Initiative will facilitate improvements in spectrum management, the Administration has achieved significant successes within the current system.

- The Administration has identified new spectrum for advanced third generation (3G) wireless services and technologies for consumers. In July 2002, the Department of Commerce released a plan in concert with the Federal Communications Commission (FCC) and the Department of Defense to make 90 MHz of spectrum available in the future for 3G wireless services while accommodating critically important spectrum requirements for national security.
- The Administration has identified how to make available additional spectrum at 5 GHz for wireless data communications, called Wireless Fidelity (WiFi). The Department of Commerce reached an agreement in February 2003 with the private sector and the Department of Defense on a technical solution that the United States is now able to present in international spectrum discussions.
- The Administration, in conjunction with the FCC, approved the use of ultrawideband (UWB) technology, which enables broadband connections and assists in the performance of critical safety services. During 2002, the Department of Commerce worked closely with the FCC to authorize mechanisms to accommodate UWB wireless technology without causing serious impact to critical radio communications services.
- The Administration has proposed several legislative changes and program initiatives to improve the spectrum management process, including: (1) providing the FCC with new authority to set user fees on unauctioned spectrum licenses; and (2) creating a Spectrum Relocation Fund to streamline the process for reimbursing government users, facilitate their relocation, and provide greater certainty to auction bidders and incumbents.

**APPENDIX B – QUICK LOOK:
RECOMMENDATIONS OF THE
FEDERAL GOVERNMENT
SPECTRUM TASK FORCE FOR
IMPROVING SPECTRUM
MANAGEMENT POLICIES**

RECOMMENDATIONS OF THE FEDERAL GOVERNMENT SPECTRUM TASK FORCE FOR IMPROVING SPECTRUM MANAGEMENT POLICIES

FACILITATE A MODERNIZED AND IMPROVED SPECTRUM MANAGEMENT SYSTEM	Action Agencies
<ol style="list-style-type: none"> 1. Consistent Methods – Standardize spectrum efficiency and effectiveness methods. 2. Best Practices Handbook – Develop of analytical engineering spectrum tools and procedures handbook. 3. Application of Information Technology – Replace paper based processes and procedures via Advanced IT. 4. Adoption of a Career Development Program – Develop training program for private sector and federal spectrum managers. 	<ol style="list-style-type: none"> 1. NTIA, FCC & Federal Agencies 2. NTIA & FCC 3. NTIA 4. NTIA & FCC
CREATE INCENTIVES FOR MORE EFFICIENT AND BENEFICIAL USE OF SPECTRUM AND POLICIES INCREASING PREDICTABILITY AND CERTAINTY FOR INCUMBENT SPECTRUM USERS	Action Agencies
<ol style="list-style-type: none"> 5. Capital Planning Process – Apply existing capital planning and investment control procedures to better identify associated spectrum requirements and costs of major investments. 6. Technical Planning Process – Implement formal process in agencies to evaluate needs for use of the spectrum before seeking NTIA spectrum certification. 7. Use of Efficient Technologies – Evaluate all spectrum use by the federal government over a five-year period to benchmark spectrum efficiency and effectiveness. 8. Incentives – Identify and implement economic incentives that promote more efficient and effective use of the spectrum. 	<ol style="list-style-type: none"> 5. Federal Agencies, OMB & NTIA 6. Federal Agencies, OMB & NTIA 7. NTIA & Federal Agencies 8. NTIA, Federal Agencies OMB
DEVELOP POLICY TOOLS TO STREAMLINE DEPLOYMENT OF NEW AND EXPANDED SERVICES AND TECHNOLOGIES WHILE PRESERVING NATIONAL AND HOMELAND SECURITY AND PUBLIC SAFETY, AND ENCOURAGING RESEARCH	Action Agencies
<ol style="list-style-type: none"> 9. National Strategic Spectrum Plan – Develop national strategic plans for radiocommunication systems, new spectrum needs, and to meet those needs. 10. Facilitation of Interoperability and Continuity of Government Communications – Implement plans for federal, state, and local communication interoperability and continuity of government operations to meet continuing terrorist threats, emergencies and day-to-day operations. 11. Spectrum Sharing Innovation Test-Bed – Identify bands and technologies for sharing, and barriers to allocation sharing and government use of commercial services. Establish a pilot program. 12. Characterization of New Technology and Expanded Services and Their Impact – Determine impact of new technologies and expanded services on incumbents, and identify improvements to reduce time to assess new uses of the spectrum. 	<ol style="list-style-type: none"> 9. NTIA, FCC & Federal Agencies 10. DHS, DOD, NTIA ,FCC & Public Safety Agencies 11. NTIA, FCC & Sharing Parties 12. NTIA, FCC and the Users
MEET CRITICAL SPECTRUM NEEDS: NATIONAL AND HOMELAND SECURITY, PUBLIC SAFETY, FEDERAL TRANSPORTATION INFRASTRUCTURE, AND SCIENCE	Action Agencies
<ol style="list-style-type: none"> 13. Policy and Plans Steering Group (PPSG) – Establish a PPSG to provide advice on policies, strategic plans, planned or revised positions on spectrum issues nationally and internationally, and help resolve major contentious spectrum policy issues. 14. Policy Coordinating Committee (PCC) – Use the existing PCC process to review spectrum-based radiocommunication issues. Revise FCC/NTIA MOU to provide an additional minimum 15 business days for PCC review. 15. National Security, Homeland Security, Public Safety and Federal Transportation Infrastructure – Modify provisions of 47 C.F.R. § 0.181 to include coordination of public safety activities within the purview of the FCC Commissioner responsible for national security, homeland security, and federal transportation infrastructure issues. 	<ol style="list-style-type: none"> 13. NTIA & Agencies 14. NTIA, Exec. Off & Agencies 15. NTIA, FCC, & Public Safety Officials

**APPENDIX C – TASK FORCE
AND WORKING GROUP
MEMBERSHIPS**

Members of the Federal Government Spectrum Task Force	
Name	Organization
Bodman, Samuel W.	Deputy Secretary Department of Commerce Task Force Chairman
Charbo, Scott	Chief Information Officer Department of Agriculture
Cooper, Steve	Chief Information Officer Department of Homeland Security
Corts, Paul R.	Assistant Attorney General for Administration Department of Justice
Gregory, Fredrick D.	Deputy Administrator National Aeronautics and Space Administration
Gross, David	U.S. Coordinator International Communications and Information Policy Department of State
McMillin, Steve	Office of Management and Budget Executive Office of the President
Parks, Rose	Chief Information Officer Department of Energy
Russell, Richard M.	Associate Director Office of Science and Technology Policy Executive Office of the President
Shane, Jeff	Under Secretary for Policy Department of Transportation
Stein, Robert	Senior Advisor to Assistant Secretary for Economic Policy Department of the Treasury
Thomas, Ed*	Chief, Office of Engineering Technology Federal Communications Commission
Tipton, W. Hord	Chief Information Officer Department of Interior
Wells, Dr. Linton II	Principle Deputy Assistant Secretary of Defense for Networks and Information Integration (NII) Department of Defense

*Federal Communications Commission Liaison

Members of the Federal Government Spectrum Task Force Working Group

Name	Organization
Alvarez, Oscar	Federal Aviation Administration, Department of Transportation
Barker, Byron	Defense Spectrum Office, Department of Defense
Barth, Richard	Department of Commerce
Beaird, Richard	Senior Deputy U.S. Coordinator, International Communications and Information Policy, Department of State
Boyd, David	Deputy Director, Research and Development and Director, SAFE-COM Program Office, Science and Technology Directorate, Department of Homeland Security
Carbery, Ronald	Senior Spectrum Regulatory Assistant, National Aeronautics and Space Administration
Domenici, Helen	Office of Science and Technology Policy, Executive Office of the President
Duffy, Michael	Deputy Chief Information Officer, Department of Justice
Duvall, Tyler	United States Department of Transportation
Elder, Erin	SAFECOM
Fox, Claudia	OSTP/EOP
Frey, Mary	Office of Research and Development and SAFECOM Program Office, Science and Technology Directorate, Department of Homeland Security
Gallagher Michael	Acting Assistant Secretary for Communications and Information, Department of Commerce, Chairman, Working Level Group
Gamble, Merri Jo	Department of Justice
Gergely, Tomas	United States National Science Foundation
Hersey, Joseph D.	Department of Homeland Security
Holcomb, Lee	Chief Technology Officer, CIO Office, Department of Homeland Security
Klug, Brian	Spectrum Program Manager, Office of the Chief Information Officer, Department of Energy
Kneuer, John	Special Counsel to Assistant Secretary, Department of Commerce/NTIA
Lilja, Jan	Associate CIO for Telecommunications Service Operations, Department of Agriculture
Lyberg, Sarah	Commerce Branch Office of Management and Budget Executive Office of the President
Lyon, Randy	Chief, Commerce Branch Office of Management and Budget Executive Office of the President
Matheson, Bob	Institute for Telecommunication Sciences , NTIA, Department of Commerce

Members of the Federal Government Spectrum Task Force Working Group

Name	Organization
McIlroy, Andrew	National Security Division, Office of Management and Budget, Executive Office of the President
Miller, James	United States Department of Transportation
Moore, Susan A.	United States Department of Agriculture
Morris, Adele	Senior Economist for Microeconomic Analysis, Department of the Treasury
Morrison, Delmon	Office of Spectrum Management /NTIA, Department of Commerce
Nebbia, Karl	Office of Spectrum Management /NTIA, Department of Commerce
Nelson, Arthur L.	Office of the Chief Information Officer, Department of the Interior
O'Malley, Michael	Office of the Secretary Department of Transportation
Owens, Derrick	Office of Spectrum Management /NTIA, Department of Commerce
Pace, Scott	Deputy Chief of Staff, Office of Space Flight, National Aeronautics and Space Administration
Pearson, Cliff	Department of Homeland Security
Quinn, Tim	Assistant Director, IRM United States Department of Agriculture
Robles, Ralph	Wireless Management Office, Department of Homeland Security
Roosa, Paul	Office of Spectrum Management /NTIA, Department of Commerce
Russo, Jim	GSA/FTS
Schroeder, Norbert	Office of Spectrum Management /NTIA, Department of Commerce
Spalt, Douglas R.	International Communications and Information Policy, Department of State
Sparrow, Victor	Deputy Director, Spectrum Management, Office of the Assistant Secretary of Defense for Networks and Information Integration (NII), Department of Defense
Stolleman, Neal	Senior Economist, Micro Economic Analysis, Department of Treasury
Struba, David	National Aeronautics and Space Administration, Director, Spectrum Policy
Taylor, Robert	Senior Advisor for Spectrum Regulatory Affairs, Office of Space Flight, National Aeronautics and Space Administration Headquarters
Tenhula, Peter	Federal Communications Commission Liaison
Thomas, Carolyn	Department of Justice
Timerman, Stu	Deputy Director, Defense Spectrum Office, Department of Defense
Turk, James E.	Department of Homeland Security
Van Wazer, Lauren	Federal Communications Commission Liaison
Wentland, Fredrick	Associate Administrator, Office of Spectrum Management, NTIA, Department of Commerce, Vice-Chairman, Working Level Group
Williams, Frank	International Communications and Information Policy, Department of State
Willis, Don	Manager, Spectrum Planning and International Division, FAA, Department of Transportation

**Members of the Federal Government Spectrum
Task Force Working Group**

Name	Organization
Worth, John	Department of Treasury
Younes, Badri A.	Director, Spectrum Management, Office of the Assistant Secretary of Defense for Networks and Information Integration (NII), Department of Defense