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United States Government Accountability Office
Washington, DC 20548

November 10, 2005

The Honorable Ted Stevens
Chairman
The Honorable Daniel K. Inouye
Co-chairman
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Joe Barton
Chairman
The Honorable John D. Dingell
Ranking Minority Member
Committee on Energy and Commerce
House of Representatives

Subject: *Telecommunications: Preliminary Information on the Federal Communications Commission's Spectrum Allocation and Assignment Process*

The radiofrequency spectrum is a natural resource used to provide an array of wireless communications services, such as mobile voice and data services, radio and television broadcasting, radar, and satellite-based services, which are critical to the U.S. economy and national security. Historically, concern about interference among users has been a driving force in the management of spectrum. The Federal Communications Commission (FCC)—an independent agency that regulates spectrum use for nonfederal users, including commercial users—and the National Telecommunications and Information Administration (NTIA)—an agency within the Department of Commerce that regulates spectrum for federal government users—have worked to minimize interference through the "allocation" and "assignment" of spectrum. Allocation involves designating "bands" of spectrum for specific types of services or classes of users, such as designating certain bands for commercial use and others for government use.[1] Assignment provides an authorization or license to use a specific portion of spectrum to entities, such as wireless companies.

Demand for the radiofrequency spectrum has exploded over the past several decades as new technologies and services have been and continue to be brought to the market in the private sector and new mission needs unfold among government users of spectrum, including wireless communications critical for public safety officials responding to

[1]In addition to allocation, FCC also specifies service rules which include, among other things, the technical and operating characteristics of equipment.

natural and man-made disasters. As a result, nearly all parties are becoming increasingly concerned about the availability of spectrum for future needs, because most of the usable spectrum in the United States has already been allocated to existing services and users. Therefore, to promote a more efficient use of this resource and meet future needs, FCC has increasingly adopted more market-oriented approaches to spectrum management in recent years, including using a competitive bidding process, or auctions, to assign spectrum to commercial users. Prior to auctions, FCC had used comparative hearings, which were quasi-judicial forums, and lotteries as assignment mechanisms. Since 1994—the first full year FCC was authorized to use auctions—FCC has held 59 auctions for over 56,000 licenses to select between competing applications for the same license or spectrum.[2]

The Commercial Spectrum Enhancement Act required us to examine FCC's commercial spectrum licensing process and report findings to the committees of jurisdiction by September 19, 2005.[3] As discussed with the committees of jurisdiction, we examined the (1) characteristics of the current spectrum allocation process for commercial uses; (2) impact of the assignment process, specifically the adoption of auctions to assign spectrum licenses, on end-user prices, investment, entry and participation of small businesses, and competition; and (3) options for improving spectrum management. To address these issues, we reviewed and synthesized relevant economic, legal, and policy-oriented literature, such as the Spectrum Policy Task Force report, a document produced by FCC staff. In addition, we hosted, in conjunction with the National Academies, two expert panels with 23 experts representing academia, government, and industry. The experts discussed policy issues related to spectrum allocation and assignment, as well as options for improving spectrum management in the future. To obtain a range of perspectives on assignment and allocation issues, we also conducted semistructured interviews with representatives and officials from academia, government, and industry. We also analyzed data from FCC's three primary spectrum license databases: Universal Licensing System (ULS), Consolidated DataBase System (CDBS), and International Bureau Filing System. To determine the reliability of the information from these databases, we interviewed officials at the Wireless, Media, and International Bureaus within FCC about their data collection and verification policies and procedures for license information and electronically tested the ULS and CDBS databases. We concluded that information from FCC's license databases was sufficiently reliable to enable us to answer our objectives. We conducted our work from March through August 2005 in accordance with generally accepted government auditing standards.

In September and October 2005, we briefed the Senate Commerce Committee staffs and provided copies of the briefing materials to the House Commerce Committee staffs, respectively. As requested, this report summarizes and transmits that briefing. The full briefing is included in enclosure I. We plan to issue a final report on this work in December 2005.

[2]The Omnibus Budget Reconciliation Act of 1993 (Pub. L. No. 103-66, § 6002, 107 Stat. 312, 387-392) added Section 309(j) to the Communications Act, as amended. Section 309(j) authorizes FCC to use competitive bidding to assign licenses for certain services.
[3]Pub. L. 108-494,118 Stat. 3986, tit. II (2004).

Summary

The current practice of allocating spectrum is largely regarded as being a "command-and-control" process—that is, the government largely dictates the use of spectrum. In particular, based on regulatory judgments, FCC determines and limits what types of services—such as broadcast, satellite, or mobile radio—will be offered in different frequency bands by geographic area. In addition, FCC issues service rules to define the terms and conditions for spectrum use within given bands. These rules typically specify eligibility standards, as well as limitations on the services that relevant entities may offer and the equipment and power levels they may use. Stakeholders we spoke to and panelists on our expert panel identified a number of weaknesses with the command-and-control process. For example, panelists and stakeholders noted that it is slow, and sometimes leads to underutilization of the spectrum. In the Spectrum Policy Task Force Report, FCC staff identifies two alternative spectrum management models that would allow it to move away from a command-and-control approach to allocation: the "exclusive, flexible rights" model, and the "open-access, or commons," model. The exclusive, flexible rights model provides licensees with exclusive, flexible use, and transferable rights within defined geographic areas. In contrast, the open-access model allows an unlimited number of unlicensed users to share frequencies, with usage rights governed by technical standards. Both models are more market-oriented than the command-and-control model—that is, supply and demand for spectrum-based services would play a greater role in determining how spectrum is used, or allocated. FCC is currently using elements of each model. For example, in recent years, FCC has provided significant operational and technical flexibility for many commercial radio services, such as personal communications service (PCS) and advanced wireless services. However, there is limited consensus about fully adopting either alternative model in the future. Recognizing that the two alternative models are not necessarily mutually exclusive, many stakeholders and panelists on our expert panel support mixed approaches to spectrum management that would combine elements of both models.

Available evidence suggests that FCC's use of auctions has had little to no negative impact on end-user prices, investment, and competition; evidence on the impact on entry and participation of small businesses is less clear. According to economic research and many of the industry stakeholders we spoke with, auctions have little to no effect on end-user prices because the auction payments represent a sunk cost,[4] which do not affect future-oriented decisions, such as pricing decisions. Similar arguments were made for the impact of auctions on investment. In addition, some industry stakeholders told us that companies' drive for a return-on-investment (i.e., they need to earn a return on the auction payment) and competition induces companies to invest and innovate. Thus, rather than diverting resources from investment and innovation, auctions encourage these actions. Many industry stakeholders also told us that auctions generally do not place companies at a competitive or financial disadvantage compared with companies that acquired licenses through means other than auction. These stakeholders noted that many licenses initially assigned through a process other than auction have been resold or

[4]Sunk costs are costs that have been incurred and cannot be reversed, for example, paying for spectrum rights at an auction.

that companies that acquired licenses via means other than auction have subsequently acquired additional licenses via auction; therefore, any competitive advantage these companies gained by obtaining licenses through other means have dissipated. The evidence is less certain regarding the effect of auctions on entry and participation of small businesses. For instance, many industry stakeholders we interviewed stated that auctions limit participation to large companies with extensive financial resources. However, others noted that large companies tended to also dominate the comparative hearing process and that auctions at least make the process transparent. In addition to auctions, companies can obtain licenses on the secondary market, which is the sale or lease of licenses among private entities. FCC has recently taken steps to facilitate secondary market transactions, including streamlining the leasing approval process.

Industry stakeholders and panelists on our expert panel offered a number of options for improving spectrum management. The most frequently cited options include (1) reexamining the distribution of spectrum to enhance the efficient and effective use of this important resource, (2) ensuring clearly defined rights and flexibility in commercially licensed spectrum bands, and (3) extending and modifying FCC's auction authority. For example, a number of panelists suggested that the government evaluate the relative allocation of spectrum for government and commercial use as well as the allocation of spectrum for licensed and unlicensed purposes. There was no consensus on these options for improvements among stakeholders and panelists on our expert panel, except to extend FCC's auction authority. Twenty-one of 22 panelists supported extending FCC's auction authority, which is scheduled to expire in 2007.[5]

Agency Comments

We provided a draft of this report to FCC, NTIA, and the Office of Management and Budget (OMB) for their review and comment. FCC provided technical comments that we incorporated where appropriate. NTIA had no comments on the draft and OMB provided no comments.

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We are sending copies of this report to the appropriate congressional committees. We are also sending this report to the Secretary of Commerce, Chairman of the Federal Communications Commission, and the Director of the Office of Management and Budget. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

[5]At the end of each expert panel session, we asked the panelists to individually answer a short series of questions about the topics discussed in order to more systematically capture individual panelist views on key dimensions. Twenty-two of the 23 panelists responded to the questions we posed at the end of each session.

Should you have any questions about this report, please contact me at 202-512-2834 or heckerj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Individuals making key contributions to this report include Amy Abramowitz, Stephen Brown, Emilie Cassou, Michael Clements, Nikki Clowers, Kate Magdalena Gonzalez, Eric Hudson, Terri Russell, Mindi Weisenbloom, and Alwynne Wilbur.

JayEtta Z. Hecker,
Director, Physical Infrastructure Issues
Enclosure

Radiofrequency Spectrum Management

Briefing for Congressional Committees

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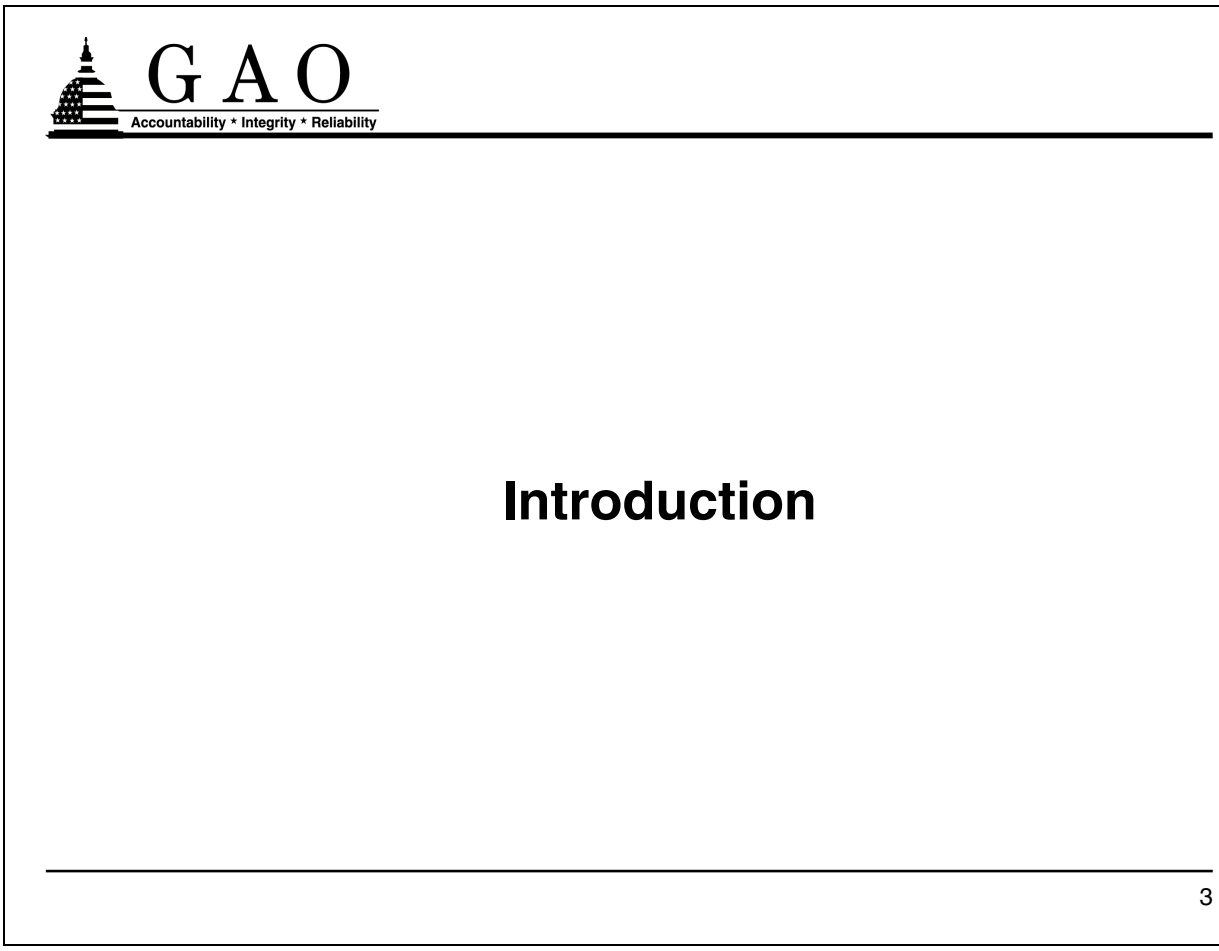
Contents

- Introduction to mandate, objectives, and scope and methodology
- Background on spectrum management
- Objective 1: Spectrum allocation
- Objective 2: Spectrum assignment
- Objective 3: Panelists' and stakeholders' suggestions for improvement
- Summary
- Attachments

2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Introduction
3

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Mandate and Objectives

The Commercial Spectrum Enhancement Act[1] required that GAO review commercial spectrum license policy, as implemented by the Federal Communications Commission (FCC). The act required that GAO report to the committees of jurisdiction by September 19, 2005.

On the basis of the mandate's language and discussions with staff from multiple committees, we identified the following three objectives:

1. What are the characteristics of the current spectrum allocation process for commercial uses?
2. How has the adoption of auctions to assign spectrum licenses affected end-user prices, investment, entry and participation of small businesses, and competition?
3. What options for improving spectrum management have been suggested?

[1]Public Law 108-494, tit. II (2004).

4

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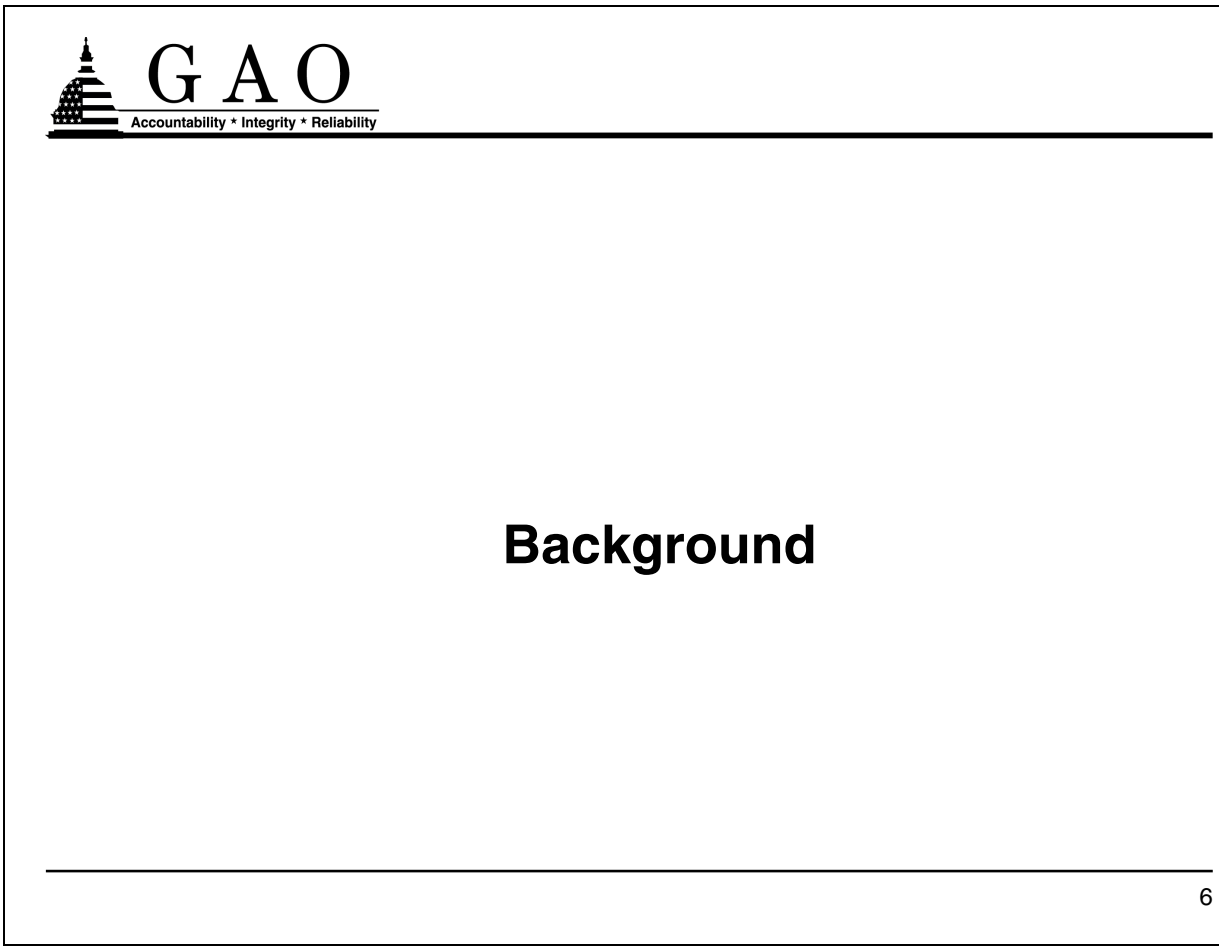
Scope and Methodology

- We hosted, in conjunction with the National Academies, 2 expert panels with 23 individuals representing academia, government, and industry in August 2005. (See attachment I for a list of panelists.)
- We conducted semistructured interviews with over 30 representatives of academia, government, and industry.
- We reviewed relevant economic, legal, and policy-oriented literature.
- We analyzed data from FCC's three primary spectrum license databases.
- We conducted our work from March through August 2005 in accordance with generally accepted government auditing standards.

5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Background
6

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Definition

What is radiofrequency spectrum?

Radiofrequency spectrum is the medium that enables wireless communications critical for commercial enterprises and government agencies.

- Commercial enterprises use spectrum to provide a variety of wireless services, including mobile voice and data, broadcast television and radio, and satellite services, in addition to a variety of private tasks.
- Government agencies use spectrum to fulfill a variety of missions, including national defense, aviation communication, public safety, and weather services.

7

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Management of Spectrum

Spectrum is managed at the international and national levels.

- The International Telecommunications Union (ITU), a specialized agency of the United Nations, coordinates spectrum management decisions among nations.
- In the United States, responsibility for spectrum management is divided:
  - **FCC** regulates spectrum use for nonfederal users, including commercial, private, and state and local government users under authority provided in the Communications Act.
  - The **National Telecommunications and Information Administration (NTIA)** manages spectrum use for federal government users and acts for the President with respect to spectrum management issues. NTIA has directed federal agencies to use only as much spectrum as they need to promote efficiency in the federal spectrum it manages.
  - FCC and NTIA, with direction from the Congress, jointly determine the amount of spectrum allocated to federal and nonfederal users. (See graph on next page for the current allocation between federal and nonfederal users.)
- The Department of State coordinates the views of FCC and NTIA to reach a U.S. position on spectrum issues for international discussions.

8

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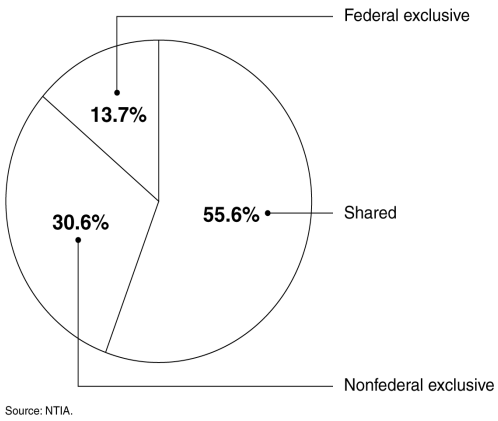
Federal and Nonfederal Spectrum



Source: NTIA.

9

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Allocation and Assignment

Historically, concern about interference among users has been a driving force in spectrum management.

Spectrum managers allocate and assign spectrum so as to minimize interference.

- **Allocation** involves designating “bands” of spectrum for specific types of services. Spectrum managers also specify the service rules, which include the technical and operating characteristics of equipment.
- **Assignment** involves providing an authorization or license to use a specific portion of spectrum to entities, such as commercial enterprises or government agencies.

10

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Assignment Mechanisms

When a portion of spectrum is assigned to a single entity, the license is considered exclusive. When two or more entities apply for the same exclusive license, FCC classifies these as mutually exclusive applications—that is, the grant of a license to one entity would preclude the grant to one or more other entities.

For mutually exclusive applicants, FCC has used three primary assignment mechanisms:

(1) **Comparative hearings**, used principally from 1934 to 1984, gave competing applicants a quasi-judicial forum in which to argue why they should be awarded a license over competitors. Critics assert that comparative hearings were time-consuming and resource intensive, often leading to protracted litigation, and lacked transparency.

11

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Assignment Mechanisms

(2) **Lotteries**, used principally from 1984 to 1993, allowed FCC to randomly select licensees from a pool of qualified applicants. Critics contend that lottery winners were not always the best suited to provide services; thus, several years could pass before the licenses were transferred in the private market to entities capable of deploying a system and effectively using the spectrum. FCC's lottery authority was eliminated by statute in 1997.[2]

(3) **Auctions**, in use since 1993, are a market-based mechanism, which grant a license to the applicant that has bid the highest price. Critics have suggested that auctions raise consumer prices for wireless services, slow the deployment of wireless systems, and are a barrier for small businesses.

[2]See, 47 U.S.C. §309(i)(5)

12

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Auction Authority

The Omnibus Budget Reconciliation Act of 1993 authorized FCC to award spectrum licenses via competitive bidding (or auctions) for certain subscriber-based wireless services. Competitive bidding authority applied to mutually exclusive applications.

The act also established policy objectives for FCC's use of auctions, including:

- the development and rapid deployment of new technologies, products, and services;
- the promotion of economic opportunity and competition and the dissemination of licenses among a wide variety of applicants, including small businesses;
- the recovery for the public of a portion of the value of the public spectrum resource; and
- the efficient and intensive use of spectrum.

13

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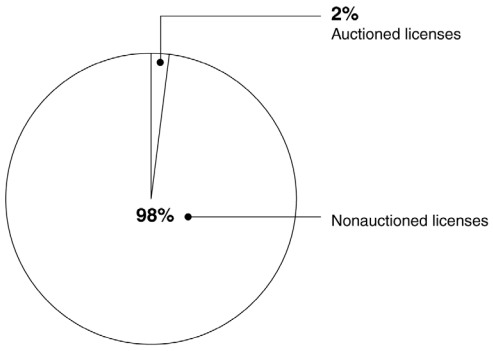
Auction Results

Since 1994, FCC has conducted 59 auctions, which have generated over $14.4 billion for the U.S. Treasury. However, a very small portion of total licenses has been auctioned; FCC has auctioned approximately 56,100 licenses—about 2 percent of total licenses.[3]



Source: GAO analysis of FCC data.

See attachment II for the assignment mechanism used and current ownership of licenses for several key industries.

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

14

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Spectrum Task Forces

Two task forces have been established to improve spectrum management in the United States.

FCC's Spectrum Policy Task Force: the task force's mission is to assist the Commission in identifying and evaluating changes in spectrum policy that would increase the public benefits derived from the use of radiofrequency spectrum.

- In November 2002, the task force released its report to the Commission. The report contained a number of recommendations to improve spectrum policy by promoting more flexible and market-based mechanisms to allocate spectrum.[4]
- The Commission has implemented several of the task force's recommendations, such as developing rules for leasing spectrum.

[4]The task force report was a product of FCC staff, and not formally adopted by the full Commission.

15

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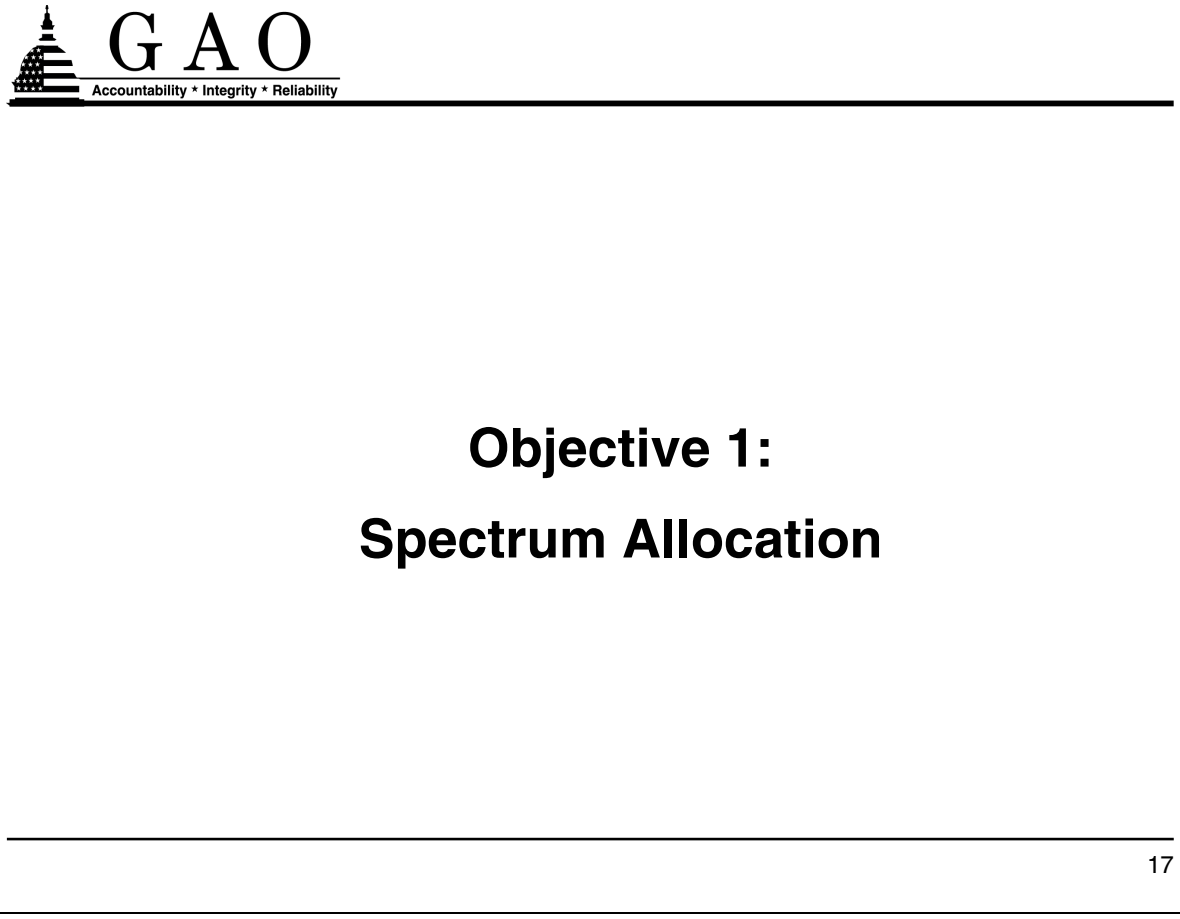
Spectrum Task Forces

The **Federal Government Spectrum Task Force**, initiated at the direction of the President, examined domestic spectrum policy to promote its development and implementation in a variety of areas, including national and homeland security, public safety, scientific research, federal transportation infrastructure, and law enforcement.

- In June 2004, the Department of Commerce released two reports based on work of the task force. These reports contained a number of recommendations for policy reforms to federal agencies' spectrum uses, such as adopting incentives for more efficient use of spectrum by government agencies.

16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Objective 1:
Spectrum Allocation
17

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Current Allocation Process

FCC currently employs a largely **command-and-control** spectrum allocation process, although the agency is moving towards more flexible licenses.

- Under the command-and-control process, FCC defines the services that can be provided, the type of equipment that can be used, and the power levels and geographic boundaries, among other things, within frequency bands.
- In recent years, FCC has provided greater operational and technical flexibility within some frequency bands, such as in those dedicated to broadband personal communications service (PCS) and wireless communications service (WCS).

18

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FCC Task Force Options for Allocation

FCC's Spectrum Policy Task Force identified two alternative models for managing the spectrum allocation process—the exclusive, flexible rights model and the open-access, or commons, model. Both models are market-oriented options for spectrum management.

- **Exclusive, flexible rights model** provides licensees with exclusive, flexible use, and transferable rights within defined geographic areas.
  - This is a license-based approach, with characteristics similar to real estate.
  - It extends the existing allocation process by granting greater flexibility regarding use of spectrum and permitting the leasing of licensed spectrum.
  - FCC's broadband PCS rules closely resemble this model, in that they provide substantial flexibility to licensees in terms of technology and usage.
  - Advantages cited by proponents include that this model (1) promotes economic efficiency, (2) creates certainty for licensees, and (3) encourages investment.
  - Disadvantages cited by critics include that it (1) might not encourage technical efficiency, (2) could deter innovation, and (3) could encourage "hoarding" by license holders.

19

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FCC Task Force Options for Allocation

- **Open-access model** allows an unlimited number of unlicensed users to share frequencies, with usage rights governed by technical standards, but with no right to interference protection.
  - Open access does not require licensing, similar to today's unlicensed spectrum.
  - FCC's Part 15 rules (which govern unlicensed use in the 900 MHz, 2.4 GHz, and 5.8 GHz bands) closely resemble this model. Cordless phones and Wi-Fi technologies operate in these bands.
  - Advantages cited by proponents include that this model (1) promotes technical efficiency, (2) could reduce "hoarding," and (3) reduces the need for long-term capital investment.
  - Disadvantages cited by critics include it (1) could result in overuse of spectrum and interference, (2) could lead to underinvestment, and (3) could lead to service limitations.

20

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FCC Task Force Options for Allocation

- FCC's Spectrum Policy Task Force recommended a balanced approach, focusing primarily on incorporating both the exclusive, flexible rights model and the open-access model. Specifically, the task force recommended:
  - moving away from command-and-control, with limited exceptions, such as public safety or to conform to treaty obligations;
  - using the exclusive, flexible rights model primarily where scarcity of spectrum is a concern and transaction costs are low; and
  - using the open-access model where scarcity is a lesser concern and transaction costs are high.

21

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Spectrum Allocation Management

We found that there is little consensus about the future management of the spectrum allocation process.

- There is little agreement about adopting either the exclusive, flexible rights model or the open-access model for commercial spectrum allocation.
- Many stakeholders support a mixed approach, with both licensed and unlicensed spectrum, but little consensus exists about the relative amount of spectrum dedicated to licensed and unlicensed purposes. (See next slide for panelists' perspectives.)
- There is little agreement about the relative amount of spectrum dedicated to commercial and governmental purposes. (See next slide for panelists' perspectives.)

22

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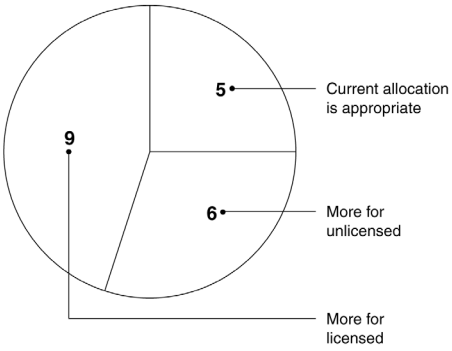
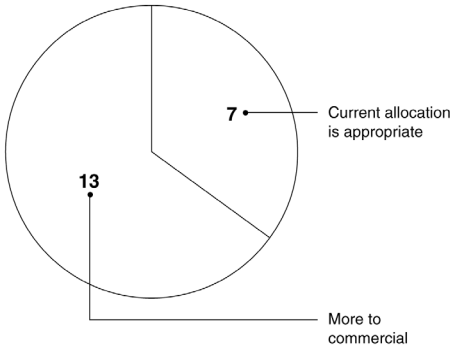
Distribution and Use of Spectrum

Panelists' perspectives on the most appropriate allocation of spectrum between licensed and unlicensed services



Source: GAO.

Panelists' perspectives on the most appropriate allocation of spectrum between government and commercial services[a]



[a] no panelists thought more should go to government

23

Objective 2:
Spectrum Assignment

24

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Auctions

FCC was authorized to use auctions to assign spectrum licenses in 1993. This authority was extended and expanded. FCC's auction authority is set to expire on September 30, 2007.

Auctions address problems associated with previous methods used to assign mutually exclusive licenses. Auctions are:

- relatively quick, reducing the average time for granting a license to less than a year from the initial application date;
- less costly than previous methods;
- transparent;
- effective in assigning licenses to entities that value them the most; and
- effective in recovering for the public a portion of the value of a national resource used for commercial purposes.

Many stakeholders we contacted believe auctions are more efficient than previous mechanisms. In addition, 11 of 17 panelists reported that auctions provide the most efficient method of assigning licenses; no panelists reported that comparative hearings or lotteries provided the most efficient method.

25

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Impact of Auctions

In addition, auctions appear to have little or no negative impact on end-user prices, investment, and competition; evidence on the impact on entry and participation of small businesses is less clear.

- End-User Prices: Economic theory suggests that auction payments do not impact end-user prices, since these are a sunk cost; competition ultimately affects end-user prices. In addition, using data on cellular prices from 1985 to 1998, one author empirically found that auctions had no effect on prices. Finally, ten members of our expert panel said that auctions do not impact end-user prices, while five said that auctions increase prices and three said that auctions decrease prices.
- Investment: Economic theory suggests that auction payments do not impact investment, since these are a sunk cost. In addition, some stakeholders mentioned that auctions may stimulate investment, as companies seek a return on their investment. Eight expert panelists said that auctions increase investment, while five said that auctions had no effect and seven said that auctions decrease investment.

26

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Impact of Auctions

- Competition: Many stakeholders believe that auctions generally do not place companies at a competitive or financial disadvantage compared with companies that acquired licenses through other means. The reasons cited include: (1) companies acquired nonauctioned licenses many years ago, (2) many nonauctioned licenses have subsequently been paid for, and (3) companies that acquired nonauctioned licenses have subsequently acquired additional licenses via auction. Eleven panelists said that auctions increase the degree of competition, while three said that auctions had no effect on competition, and four said that auctions decreased competition.
- Entry and Participation of Small Businesses: A number of stakeholders told us that auctions hinder the participation of small businesses because of the financial resources needed to win spectrum rights at auction; therefore, auctions limit wireless markets to large businesses that have extensive financial resources. However, some stakeholders noted that large companies tended to dominate the comparative hearing process as well. Expert opinion diverged on this issue: eight panelists said that auctions increase entry while another eight said that auctions decrease entry; three panelists said that auctions had no effect on entry.

27

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Secondary Markets

Secondary markets provide an additional mechanism for entities to acquire licenses after the initial assignment.

- Secondary markets incorporate the sale and lease of licenses. In some instances, companies acquire licenses through the purchase of an entire company (e.g., Cingular's purchase of AT&T Wireless).
- Secondary markets can provide several benefits, including (1) the more efficient use of spectrum and (2) the facilitation of new technologies and participation of small businesses.
- Potential hindrances to an effective secondary market include the lack of flexibility in use of the spectrum.

28

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Secondary Markets

- Recent FCC rulemakings facilitate secondary-market transactions.
  - FCC created two mechanisms for spectrum leasing: Spectrum Manager Leasing—where the licensee retains legal and working control of the spectrum—and *De Facto* Transfer Leasing—where the licensee retains legal control but the lessee assumes working control of the spectrum.
  - FCC authorized leasing for most wireless radio licenses with exclusive rights.
  - FCC streamlined the leasing approval process, including no prior approval for Spectrum Manager Leases and immediate approval for *De Facto* Transfer Leases that do not raise potential public interest concerns.

29

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Objective 3:
Panelists' and Stakeholders' Suggestions for Improvement

30

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Concerns about Spectrum Management

Panelists, stakeholders, and previous GAO reports identified several concerns about current spectrum management policy. These concerns include:

- The government-wide structure for spectrum management.
- The process of allocating spectrum.
- The process of assigning spectrum for commercial purposes.

Government-wide structure: The bifurcated responsibility for spectrum management can hinder efforts at fundamental reform of spectrum management.

- Neither FCC nor NTIA has ultimate decisionmaking authority over spectrum management or the authority to impose fundamental reform.
- The current structure can lead to protracted spectrum decisions.
- Because of the lack of a single decisionmaking point for spectrum reform, in 2003, GAO recommended the establishment of an independent commission that would conduct a comprehensive examination of current U.S. spectrum management. The commission would involve all relevant stakeholders, including commercial interests, government agencies, regulators, and others, to ensure a diversity of views.

31

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Concerns about Spectrum Management

Allocation: Many panelists and stakeholders believe the spectrum allocation process is less effective than it could be. In criticizing the current process,

- Panelists most frequently identified the slowness of the allocation process as one of its weakness (10 panelists).
- Some stakeholders note that the current allocation process leads to underutilization of the spectrum. For example, a recent report noted that during a 4-day period in New York City, only 13 percent of spectrum between 30MHz and 2.9GHz was occupied at one time or another.
- Some stakeholders assert that spectrum is not allocated to the highest value uses.
- Some entities, including those in public safety and critical infrastructure, express concern about the limited amount of spectrum allocated for noncommercial use.

Assignment: Some panelists and stakeholders believe the incentive programs for small business are flawed. For example, some stakeholders noted that large companies ultimately acquire licenses initially assigned with small business incentives.

32

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Suggested Improvements

Panelists and stakeholders made a variety of suggestions to improve spectrum management. The most frequently suggested improvements include the following.

- Reexamine the distribution of spectrum to enhance the efficient and effective use of spectrum.
- Ensure clearly defined rights and flexibility in licensed spectrum bands to promote efficiency.
- Extend and modify FCC's auction authority.

There was no consensus on these suggested improvements among stakeholders and our panelists, except for extending FCC's auction authority.

33

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Suggested Improvements

Reexamine the distribution of spectrum to enhance the efficient and effective use of spectrum.

- To encourage greater utilization of spectrum, systematically track the level of use of spectrum allocations, perhaps through a “spectrum census.”
- Evaluate the relative allocation of spectrum for government and commercial use.
- Evaluate the relative allocation of spectrum for licensed and unlicensed purposes.
- Create a balanced approach to spectrum allocation, considering all spectrum users.

34

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Suggested Improvements

Ensure clearly defined rights and flexibility in licensed spectrum bands to promote efficiency.

- Clarify and better define spectrum license rights.
- Permit more flexible use in licensed bands, especially in terms of the types of services offered within licensed bands and the technology used within bands.
- Allow FCC to continue developing and implementing innovative spectrum management practices while ensuring a balance between flexibility and interference protection.

35

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Suggested Improvements

Extend and modify FCC's auction authority.

- Spectrum auctions should promote the efficient use of spectrum, not the maximization of revenues for the government.
- Panelists and stakeholders overwhelmingly supported an extension of the auction authority (21 of 22 panelists).
- Of those panelists who thought the auction authority should be extended, some thought there should be some modifications. These modifications fall into the following three categories:
  - The nature of license rights for auction winners;
  - Secondary market changes, including greater involvement by FCC; and
  - Reexamination of the existing small business incentives.

36

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Suggested Improvements

The nature of license rights for auction winners.

- Panelists suggested that FCC more clearly define the rights that are won by license holders.
- Some panelists preferred more defined property rights, thereby allowing licensees to use the spectrum in any way they see fit, while one panelist simply wanted the nature and scope of the rights better defined.

Secondary market changes, including greater involvement by FCC.

- Some panelists said that FCC needed to be more involved in the secondary market, either by overseeing transactions to ensure transparency or by promoting use of the secondary market.
- A few panelists also suggested the development of “two-sided” auctions—in which FCC offers unassigned spectrum and existing license holders offer encumbered spectrum.

37

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Suggested Improvements

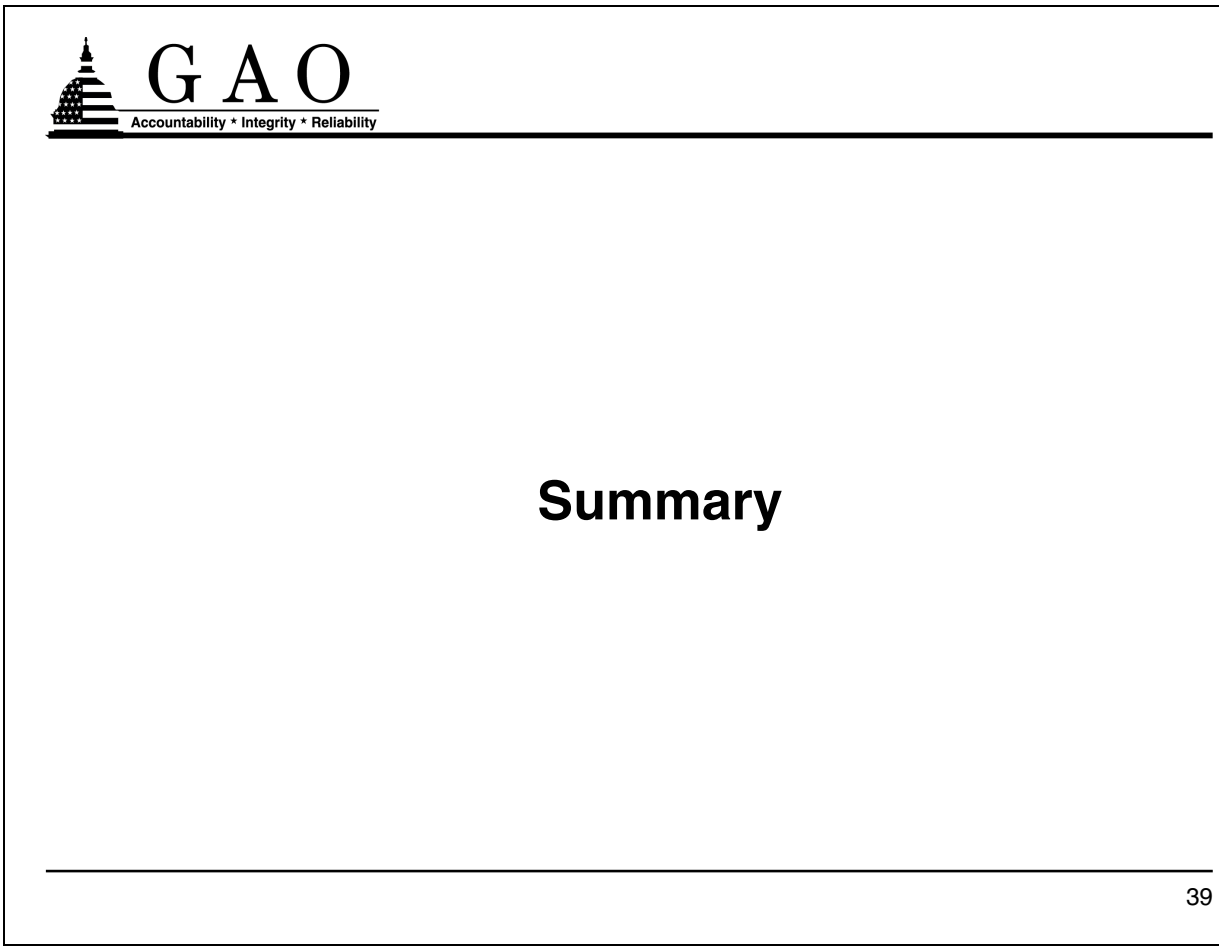
Reexamination of the existing small business incentives.

- Some stakeholders and panelists do not support incentive programs for small businesses. In their view, (1) the wireless industry is not a small business industry; (2) while the policy may have been well intended, the current program is flawed; and (3) such incentives create inefficiencies in the market.

- Some stakeholders suggested alternative programs or policies that would support small and rural business better than the current bidding credits mechanism. These suggestions include (1) having licenses cover smaller geographic areas, (2) using auctions set-aside exclusively for small and rural businesses, and (3) providing better lease options for small and rural businesses.

- Still, some stakeholders we spoke with have benefited from the bidding credits program and believe that it has been an effective way of promoting small business participation.

38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Summary
39

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- Spectrum management is a complex process, for which no single government agency is responsible.
- While the current spectrum management process is less effective than many stakeholders would like, there is little consensus on how to improve the process.
- One aspect of spectrum management that appears very effective is the competitive bidding process for assigning licenses for commercial entities. Stakeholders overwhelmingly perceive auctions as the most effective mechanism for assigning licenses.
- FCC's auction authority expires on September 30, 2007.

40

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Attachment I

Participants in GAO / National Academies Expert Panel on Radiofrequency Spectrum Management

August 9, 2005

Dale Hatfield (moderator)	Independent Consultant and Adjunct Professor, University of Colorado, Boulder
Peter Cramton	Professor, University of Maryland, College Park
David Donovan	President, Association for Maximum Service Television, Inc.
Gerald Faulhaber	Professor, The Wharton School, University of Pennsylvania
Bruce Franca	Deputy Chief, Office of Engineering and Technology, Federal Communications Commission
Ellen Goodman	Associate Professor, Rutgers School of Law, Camden
Mark McHenry	President, Shared Spectrum
William Moroney	President and CEO, United Telecom Council
Charla Rath	Executive Director, Spectrum and Public Policy, Verizon Wireless
David Reed	Fellow, HP Labs and Adjunct Professor, Massachusetts Institute of Technology
Steve Sharkey	Director, Spectrum and Standards Strategy, Motorola, Inc.
Badri Younes	Director, Spectrum Management, Department of Defense

41

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Attachment I

Participants in GAO / National Academies Expert Panel on Radiofrequency Spectrum Management

August 10, 2005

Gregory Rosston (moderator)	Deputy Director, Stanford Institute for Economic Policy Research, Stanford University
Paul Besozzi	Attorney, Patton Boggs, LLP
Diane J. Cornell	Vice President, Regulatory Policy, Cellular Telecommunications and Internet Association
Joe Gattuso	Senior Policy Advisor, Office of the Assistant Secretary, National Telecommunications and Information Administration
Kalpak Gude	Vice President, Government Regulatory Affairs and Associate General Counsel, PanAmSat
Thomas W. Hazlett	Professor of Law and Economics, George Mason University
Dewayne Hendricks	CEO, The Dandin Group
Kevin Kahn	Intel Senior Fellow, Communications Technology Lab, Intel Corporation
David Sidall	Attorney, Paul, Hastings, Janofsky & Walker, LLP
Jennifer Warren	Senior Director, Trade & Regulatory Affairs, Lockheed Martin
Jimmy R. "Rusty" Williams	Infrastructure Services Manager, Planning & Engineering, Southern Company Services

42

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Attachment II

Assignment and Current Ownership of Licenses in Key Wireless Industries

Band or Service	Assignment Mechanism	Largest License Holder
Wireless Services		
Broadband PCS	Auction	T-Mobile USA, Inc.
Cellular	Comparative hearing, lottery, auction	Alltel Corporation
Paging	Auction	Verizon Wireless Messaging Services
Specialized Mobile Radio (SMR) Land Mobile-Commercial and Market Based Services	Application	Nextel Communications
Broadcasting		
AM Radio Service	Application, auction	Clear Channel Broadcasting
FM Radio Service	Application, auction	Clear Channel Broadcasting
Television	Application, auction	Gray Television Licensee, Inc.
Satellite		
Direct Broadcast Satellite (DBS)	Application, auction	EchoStar Satellite LLC
Digital Audio Radio Service (DARS)	Auction	XM Radio Inc. Sirius Satellite Radio, Inc.

43

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