8th Annual International Symposium on Advanced Radio Technologies

Tutorial C:
The President's Spectrum Initiative

Eric R. Stark
Associate Administrator
Office of Policy Analysis and Development

U.S. Department of Commerce
National Telecommunications and Information Administration

www.ntia.doc.gov
March 7, 2006

Overview

- NTIA / Office of Policy Analysis & Development
- The President's Spectrum Policy Initiative
- Economics 101 & A Short Spectrum History
- Plan for Identifying and Implementing Incentives
- Conclusion

President's Spectrum Policy Initiative

"The existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use."

- President George W. Bush, Presidential Memorandum, May 29, 2003

Stated Purposes:

- To foster economic growth,
- Ensure national and homeland security,
- Maintain U.S. global leadership in communications technology development and services,
- Satisfy other vital U.S. needs such as public safety, scientific research, federal transportation infrastructure and law enforcement.

President's Spectrum Policy Initiative Goals and Objectives

From the President's May 2003 Executive Memorandum:

- Establish incentives for achieving improved efficiencies in spectrum use and for providing incumbent users more certainty of protection from unacceptable interference
- Modernize and Improve the Spectrum Management System
- Promote the timely implementation of new technologies and services while preserving national and homeland security, enabling public safety, and encouraging scientific research
- Develop means to address the spectrum needs of critical governmental missions

President's Spectrum Policy Initiative Milestones

President's Executive Memorandum to Federal Departments and Agencies (May 2003)

- Stated Need and Objectives

Two Reports from the Secretary of Commerce to the President (June 2004)

- Recommendations of the Federal Government Spectrum Task Force
- Recommendations from State and Local Governments and Private Sector Responders

Second Executive Memorandum (November 2004)

- Adopted recommendations as policy
- Assigned responsibilities and deadlines for implementation

Implementation Plan from Secretary of Commerce (June 2005)

- To implement those recommendations of the reports not expressly directed to other agencies and offices

President's Spectrum Initiative Implementation Projects

- ***Project A:*** Improve Stakeholder Participation and Maintain High Qualifications of Spectrum Managers
- ***Project B:*** Reduce International Barriers to United States Technologies and Services
- ***Project C:*** Modernize Federal Spectrum Management Processes with Advanced Information Technology
- ***Project D:*** Satisfy Public Safety Communications Needs and Ensure Interoperability
- ***Project E:*** Enhance Spectrum Engineering and Analytical Tools
- ***Project F:*** Promote Efficient and Effective Use of Spectrum
- ***Project G:*** Improve Planning and Increase Use of Market-based Economic Mechanisms in Spectrum Management

Some Basic Economic Principles

- **Scarcity:**
  - where resources available for producing output are insufficient to satisfy wants (the “raison d’etre” of economics).

- **Economic Efficiency:**
  - the production of the “best” combination of outputs by means of the most efficient combination of inputs.

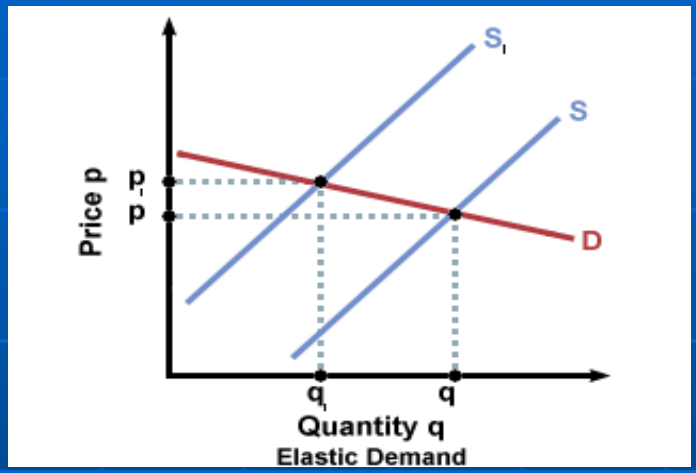
  … allocative efficiency occurs when the prices that consumers pay for goods and services are equal to the marginal costs of their production.

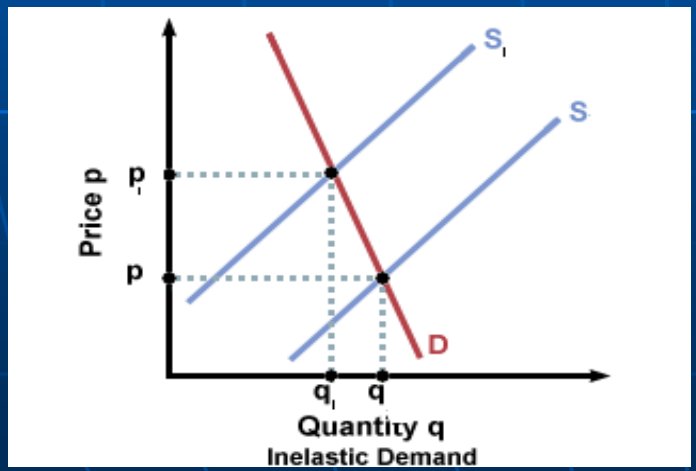
  … distributive efficiency is maximized when a product or service is distributed among consumers in such a way that no mutual gains from trade are possible.

  ... technical efficiency occurs when combination of inputs minimizes production cost of its output and producing output at the least *opportunity cost*.

- **Opportunity Cost:**
  - the foregone value of the next best alternative that is not chosen.

The Market's Pursuit of Economic Efficiency





- The increased cost of an input such as spectrum shifts the market supply (S) curve for the service higher.
- Result: The market price rises and output declines at existing demand. Price elasticity of market demand (D) will determine extent of changes.
- Significance: Knowing the actual costs will lead to the true value of spectrum … and a new equilibrium of S and D.

Source: SparkNotes.com

Potential Economic Inefficiencies

- **Competitive equilibrium is economically efficient (i.e., maximizes social surplus) provided *all* costs and benefits are reflected in the market D and S curves.**

- **Some *challenges*:**
  - It may not be possible in some instances for firms to capture peoples' willingness to pay (public goods, external benefits).
  - Not all social costs may be reflected in the prices firms pay for factors of production (external costs).
  - A firm's total costs may not be, in fact, minimized because the output from given inputs is less than the maximum feasible level (a situation called "technical or X inefficiency."
  - Economic inefficiencies may also arise from market power.

Economics and Spectrum Management: Ronald H. Coase

- ***The Federal Communications Commission*, October 1959, The Journal of Law & Economics, University of Chicago**
  - Systematically argued that a price system is a more efficient means to allocate the use of radio frequency spectrum than command and control.
  - Argued that the institution of a pricing system *plus* property rights results result in optimal efficiency.
  - Rights mixed with regulation and market transactions can mitigate interference, then pricing can establish the value that is needed for a producer to determine an optimal mix of inputs.
  - Regulation without private property rights and pricing does not produce the best solution.
- **"Good morning, Professor. Please tell us, is this all a big joke?"**
- **Nobel Prize Laureate in 1991.**

A Brief History of Spectrum Licensing in the United States

- Early 1920's: Secretary of Commerce issued licenses on a first-come, first-served basis but courts ruled he had no authority.
- 1927: Federal Radio Act. Licenses assigned using a "public interest" standard.
- 1934: FCC Act. President (through the Commerce Dept.) to regulate federal use of spectrum; new Commission to manage nonfederal spectrum.
- FCC initially used comparative hearings – criticized as protracted and too political.
- 1982: Congress permits lotteries, producing windfall profits; a glut of applications negates expected administrative savings.
- **1993: Omnibus Budget Act permits FCC auctions!**
- Today: Federal administration does not use market-based assignments; IRAC coordinates between federal and nonfederal spectrum use.

A Briefer History of Spectrum Auctions in the United States

- **Omnibus Budget Act of 1993 amended the 1934 Communications Act (auth. extended in 1997): Auctions could be used to assign licenses when more than one applicant involved.**
  - Spectrum's value would be realized by Treasury.
  - Efficiency promoted – spectrum would go to those who value most.
- **First auction (July 1994) generated $100 million.**
- **$8 billion, 1994-96; over $20 billion, 1997 (90% for PCS)!**
- **Upcoming auctions:**
  - May 10, 2006: Several MHz in the 800 MHz band for Air-Ground Radiotelephone Services
  - June 29, 2006: 90 MHz of advanced wireless services spectrum in the 1710-1755 MHz and 2110-2155 MHz bands.
  - 2008: DTV conversion, freeing 84 MHz (in the 700 MHz band) for advanced wireless services.

Project G. Improve Planning and Increase Use of Market-Based Economic Mechanisms in Spectrum Management

- **NTIA will identify and propose economic incentives to encourage efficient spectrum use, and will develop a plan by November 2005 to identify and implement incentives for improving efficiency in spectrum use**
- **NTIA will:**
  - analyze incentives appropriate to federal government spectrum use and make recommendations
  - work with the Congress, the FCC, and other Administration agencies to advance legislation for the efficient use of spectrum and otherwise promote the implementation of a wide range of incentives

Plan for Identifying and Implementing Incentives

- Economic value of spectrum may be basis for incentives rather than mandates for improved spectrum efficiency
- Efficiency effects may be “technical” or “economic.”
- Need close look at applicability to Federal Government users.
- The Plan:
  - Information Gathering
  - Spectrum Valuation
  - Studying Feasibility of Federal User Fees
  - Non-Fee Incentives
  - Sharing
  - Property Rights & Secondary Markets

Plan for Identifying and Implementing Incentives:
Information Gathering (A)

- **Researching economists, academics, government reports**

- **Studying International Spectrum Management Practices**
  - Brazil, Canada, Chile, Guatemala, Jamaica, Mexico, Panama, United States, Belgium, Czech Rep., Denmark, Finland, France, Germany, Hungary, Latvia, Netherlands, Sweden, Switzerland, U.K., Hong Kong, India, Japan, Philippines, Singapore, South Korea, Egypt, Jordan, Morocco, Nigeria, South Africa, Uganda, Australia, New Zealand.
  - Market-based approaches in the UK, New Zealand, Australia, and Guatemala.
  - Such approaches include trading, flexible use rights, property rights, auctions and fees

Plan for Identifying and Implementing Incentives:
Information Gathering (B)

- February 28 to March 1, 2006, *Improving Spectrum Management Through Economic or Other Incentives: A Workshop*, held at the National Academy of Sciences
- Featured the world's best spectrum experts from academia, government, and industry
- Solicited views and proposals for policy, regulatory, and legislative change

Plan for Identifying and Implementing Incentives:
Spectrum Valuation

- OMB now requires agencies to consider value when procuring systems.
- Cash-flow or secondary market valuation standard for commercial services not applicable to government systems.
- Valuation depends on how spectrum rights are defined, quantified, or limited.
- Spectrum allocated solely for particular use, e.g. government radar, may have little or no commercial value.
- Determination of value will be basis for creating incentives.
- Includes benchmarking of government spectrum and identification of opportunity costs.

Plan for Identifying and Implementing Incentives:

Studying Feasibility of Federal User Fees

- **Existing fees (NTIA and FCC) calculated to cover administrative expenses**
- **Consistent interest in fees related to spectrum value as means of inducing efficiency**
- **May or may not be feasible, practical or appropriate**
- **Studying:**
  - fee methodologies
  - benchmarking and comparison to commercial spectrum
  - opportunity costs
  - applicability to specific federal bands and operations
  - potential affects on agency missions

Plan for Identifying and Implementing Incentives:
Non-Fee Incentives

Possibilities:

- **Spectrum scorecards by agency**
- **Spectrum audits**
- **Financial incentives to upgrade equipment**
- **Industry incentives to manufacture equipment that meets government specifications**

Plan for Identifying and Implementing Incentives:
Sharing

- **Dynamic sharing**
  - Such access may include new technologies such as cognitive radios
  - The environment may be unlicensed or licensed
  - Operates within pre-established policy guidelines.
- **Government to government sharing**
- **Government to industry and Industry to government sharing**

Plan for Identifying and Implementing Incentives:
Property Rights & Secondary Markets

- **NTIA will continue its support of legislation to extend the FCC's authority to conduct auctions and collect fees.**
- **More spectrum to auction?**
- **Changes to user rights:**
  - Exclusive rights with technical flexibility
  - Advancing secondary markets and ease of trading
  - Unlicensed bands
- **Challenges:**
  - Interference
  - Windfall

CONCLUSION

Eric R. Stark
Associate Administrator
Office of Policy Analysis and Development

estark@ntia.doc.gov

202-482-1880