Spectrum Management Reform

Contribution of the Technical Community

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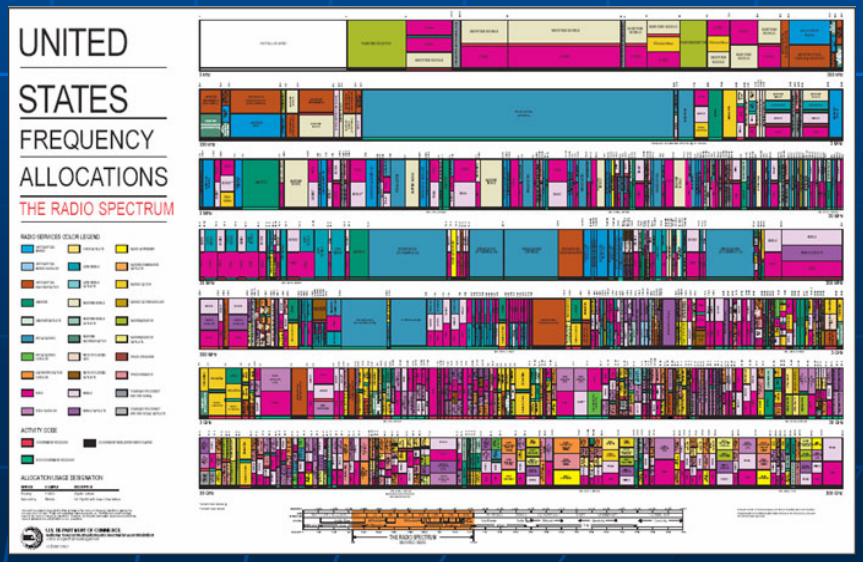
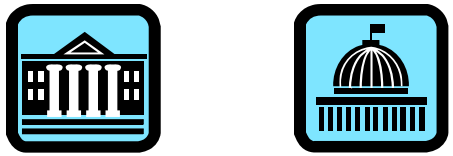
Karl B. Nebbia
Associate Administrator,
National Telecommunications and Information Administration
Office of Spectrum Management

The National Telecommunications and Information Administration (NTIA)

- Advises the President on telecommunications and information policy issues
- Manages Federal Government use of frequency spectrum
- Represents the Executive Branch in international & domestic telecommunications policy activities
- Performs telecommunications research and engineering for both the Federal Government and the private sector



U.S. Spectrum Management Organization



Executive Branch (President)

Legislative Branch (Congress)

NTIA

Federal Users

National Defense

Federal Law Enforcement, Homeland Security & Emergency Services

Transportation

Resource Mgmt & Control

COORDINATION

ADVISORY LIAISON

FCC

Non-Federal Users

Commercial

Private

Business

State & Local Government (including public safety)

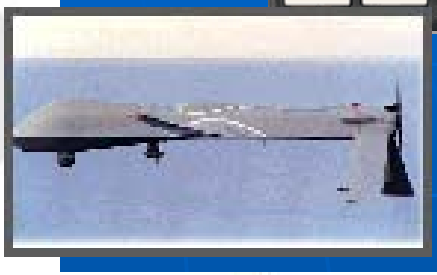
Media

INTERDEPARTMENT RADIO ADVISORY COMMITTEE

Chaired by NTIA

19 Federal Agencies and the FCC

Wireless in Our World – *Requires Spectrum!*



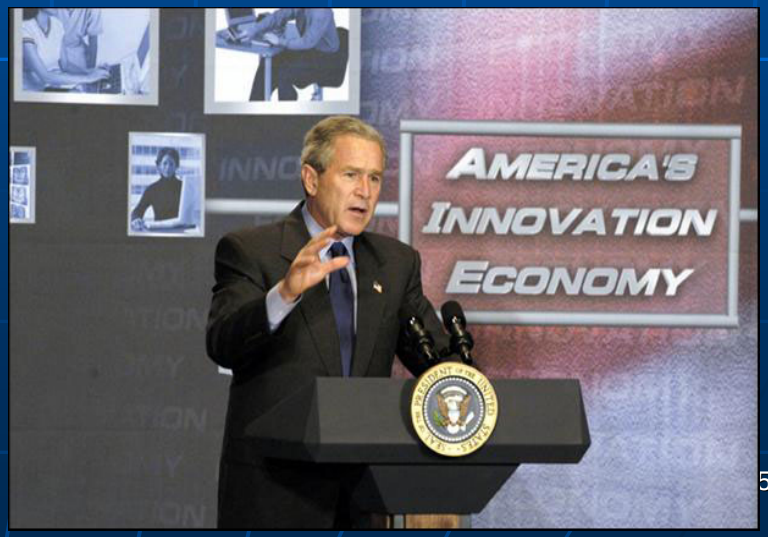
President's Spectrum Policy Initiative

"Why we must change our culture"

- *"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

- Committed the Administration to develop a comprehensive U.S. spectrum policy for the 21st century
- The Secretary of Commerce was charged to lead this initiative
- Presidential Memo November 30, 2004
- 24 Recommendations
- Implementation Plan



Evolution of Spectrum Management

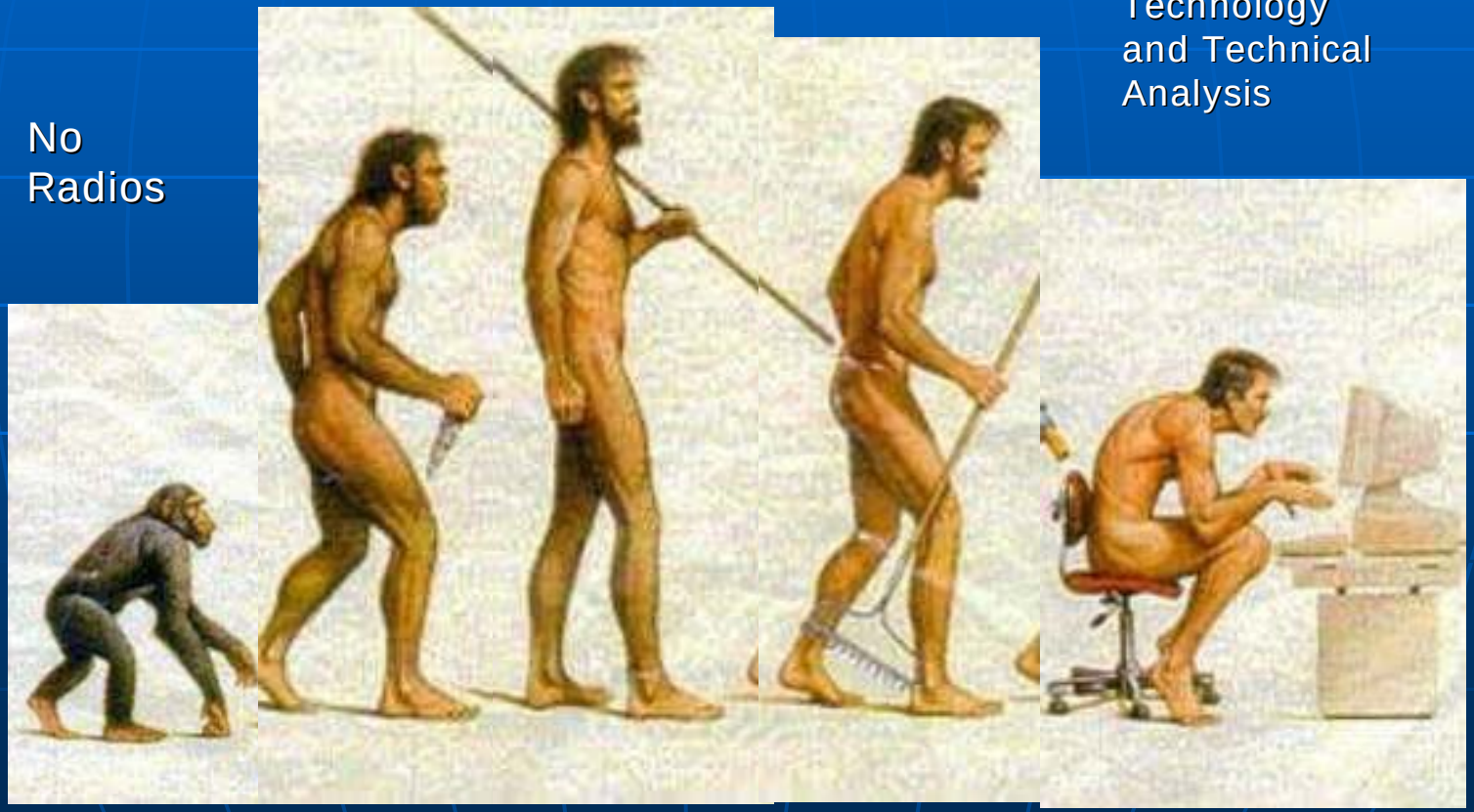
No Radios

No Spectrum Management

Manage by Rules

Manage by Markets

Manage by Technology and Technical Analysis



Technical Areas

- Spectrum Efficiency and Effectiveness
- Spectrum Management Best Practices Handbook
- Development of Analytical Tools for Spectrum Management
- Spectrum Sharing Test-Bed Program

Spectrum Efficiency and Effectiveness

- Develop standardized methods for evaluating efficiency of spectrum use by the federal government.
- Apply the standardized methods to review the federal government spectrum use over a five-year period.
- Determine and characterize current spectrum use by the federal government.
- Describe how the current approval process influences spectrum efficiency and effectiveness.
- Propose potential improvements with new technologies, spectrum management practices, standards, and policies.
- Propose reforms to spectrum management polices that affect efficiency.

Spectrum Efficiency and Effectiveness

- The existing 36 different radiocommunications services were evaluated using the following criteria to determine which ones should be examined as part of the spectrum efficiency and effectiveness study:

  - Criteria 1 - Radiocommunication services with no federal allocation
  - Criteria 2 - Radiocommunication services that are passive users of the spectrum
  - Criteria 3 - Radiocommunication services that provide wide area federal and non-federal data services
  - Criteria 4 - Radiocommunication services that use narrow non-contiguous spectrum allocations
  - Criteria 5 - Radiocommunication services that are subject to international standards

Spectrum Efficiency and Effectiveness

- Based on the established criteria the following radiocommunication services are being examined as part of the spectrum efficiency study:

  - Mobile and Land Mobile
  - Fixed
  - Radiolocation and Radiodetermination
  - Meteorological-Satellite and Meteorological Aids
  - Fixed and Mobile Satellite
  - Space Operation, Space Research (communications), Earth Exploration-Satellite (communications), and Inter-Satellite
  - Earth Exploration-Satellite (active) and Space Research (active)

Spectrum Efficiency and Effectiveness

- The following are examples of areas under consideration to increase spectrum efficiency in the federal bands:

  - Implement more accurate interference-based frequency assignment models.

  - Increase the use of spectrum efficient technology.

  - Improve usefulness, content, and accuracy of federal frequency assignment database.

  - Examine current usage of frequency assignments.

  - Develop measurement techniques to evaluate spectrum usage.

  - Eliminate inefficient usages of spectrum.

  - Examine the impact of implementing new regulatory policy to improve spectrum efficiency.

Spectrum Efficiency and Effectiveness

- The following reports have been published by NTIA addressing spectrum efficiency in the land mobile radio service:
  - NTIA Report 08-451, Assessment of Alternative Future Federal Land Mobile Radio Systems
  - NTIA Report 07-448, Measurements to Characterize Land Mobile Channel Occupancy for Federal bands 162-174 MHz and 406-420 MHz in the Washington, D.C. Area
  - NTIA Report 07-447, Assessment of Federal and Non-Federal Land Mobile Radio Frequency Assignment Methodologies
  - NTIA Report 06-440, Federal Land Mobile Operations in the 162-174 MHz Band in the Washington, D.C., Area Phase 1: Study of Agency Operations
- Document providing overall recommendations for spectrum efficiency in federal land mobile radio bands is being prepared.

Spectrum Engineering Best Practices Handbook

- Develop a handbook documenting the best practices in spectrum engineering for use by regulators, technology developers, manufacturers, and service providers.
- The “Best Practices Handbook” (BPH) will bring together a common set of approaches for conducting engineering analyses and will develop a common set of criteria for performing technical studies to evaluate emerging technologies.
- The BPH will guide the technical discourse on policy issues involving the potential interference impact of one system or technology on another.

Spectrum Engineering Best Practices Handbook

- Develop a series of individual technical memoranda on specific technical topics to be included in the BPH, and coordinate each of the technical memoranda with the federal agency Working Level Group E members, the Interdepartment Radio Advisory Committee, and the Federal Communications Commission (FCC).
- Combine the individually coordinated technical memoranda to create draft BPH.
- Solicit comments from the public by issuing a public notice.
- Adopt portions of the BPH in appropriate sections of the NTIA *Manual of Regulations and Procedures for Federal Radio Frequency Management.*
- Apply or refer to appropriate portions of the BPH in future FCC rulemaking proceedings.

Spectrum Engineering Best Practices Handbook

- The BPH will address:
  - basic elements of electromagnetic interference
  - electromagnetic compatibility concerns
  - electromagnetic compatibility analysis process
  - transmitter and receiver standards
  - measurement techniques
  - spectrum engineering best practices guidelines

Spectrum Engineering Best Practices Handbook

- The following reports to be used in developing the BPH have been published by NTIA:
  - NTIA Report TR-06-444, Effects of Interference on Radar Receivers
  - NTIA Report TR-07-449 Propagation Loss Prediction Considerations for Close-In Distances and Low-Antenna Height Applications
  - Communications Receiver Performance Degradation Handbook
- The following technical memorandums to be used in developing the BPH have been completed and are being reviewed by the federal agencies:
  - Interference protection criteria
  - Radiowave propagation modeling
  - Antenna modeling

Spectrum Engineering Best Practices Handbook

The Institute for Telecommunication Sciences is providing technical support in the following areas:

- measurements to develop a low antenna height short range propagation model
- measurements examining antenna polarization mismatch loss
- measurements examining front-end overload effects of low noise amplifiers
- modeling and simulation examining receiver performance in the presence of different types of interfering signals

Develop Analytical Tools for Spectrum Management

- NTIA will provide federal and non-federal spectrum managers with analytical tools to manage the spectrum efficiently.
- New analytical and procedural methodologies developed in the BPH will serve as the technical basis for more advanced spectrum management tools.
- NTIA with assistance of the federal agencies and the FCC, will develop and maintain a comprehensive document of all activities regarding ongoing spectrum engineering and analysis model development.
- This information will be made available to the federal agencies to be used in the development and purchase of spectrum management tools.

Spectrum Sharing Test-Bed Pilot Program

- NTIA and the Federal Communications Commission (FCC) are to establish a spectrum sharing test-bed where federal and non-federal users can study the feasibility of increasing the efficient use of the spectrum.
- As part of establishing the spectrum sharing test-bed NTIA and the FCC are each to identify 10 MHz of spectrum for shared federal and non-federal use from bands allocated on an exclusive or shared basis.
- The spectrum sharing test-bed will provide a means for evaluating emerging technologies to improve sharing between federal and non-federal users.

Spectrum Sharing Test-Bed Pilot Program

- In June 2006, the NTIA and the FCC each issued a request for public comments to address implementation of the test-bed.
- The Commerce Spectrum Advisory Committee reviewed the public comments and made recommendations to NTIA on how the test-bed should be implemented.
- NTIA sought advice from the federal agencies on the Interdepartment Radio Advisory Committee on implementing the test-bed.
- In February 2008, NTIA and the FCC issued public notices describing the test-bed and seeking participants.

Spectrum Sharing Test-Bed Pilot Program

- NTIA identified the 410-420 MHz band and the FCC designated 10 MHz in the 470-512 MHz band for test-bed operations.
- The test-bed will evaluate the ability of Dynamic Spectrum Access (DSA) devices employing spectrum sensing and/or geo-location techniques to share spectrum with land mobile radio systems.
- The test-bed will be implemented in three phases:
  - Phase I - equipment characterization at the NTIA Institute for Telecommunication Sciences
  - Phase II - evaluation of DSA sensing and/or geo-location capabilities
  - Phase III - field operation evaluation of DSA device
- A process open to the public will be used to review and comment on test-bed documents.

Spectrum Sharing Test-Bed Pilot Program

- The following organizations have been selected to participate in test-bed pilot program:
  - Adapt4 LLC
  - Adaptrum Inc.
  - BAE Systems
  - Motorola Inc.
  - Shared Spectrum Company
  - Virginia Polytechnic Institute and State University

- Information on the test-bed pilot program is available at http://www.ntia.doc.gov/ntiahome/frnotices/2006/spectrumshare/comments.htm

SUMMARY

- Tasks performed under The President's Spectrum Policy Initiative will:

  - Develop consistent methods for assessing new technologies;

  - Ensure that the federal use of the radio frequency spectrum is as efficient as possible;

  - Develop policies and tools to streamline the deployment of new technologies while preserving national and homeland security, public safety, and encourage scientific research.