



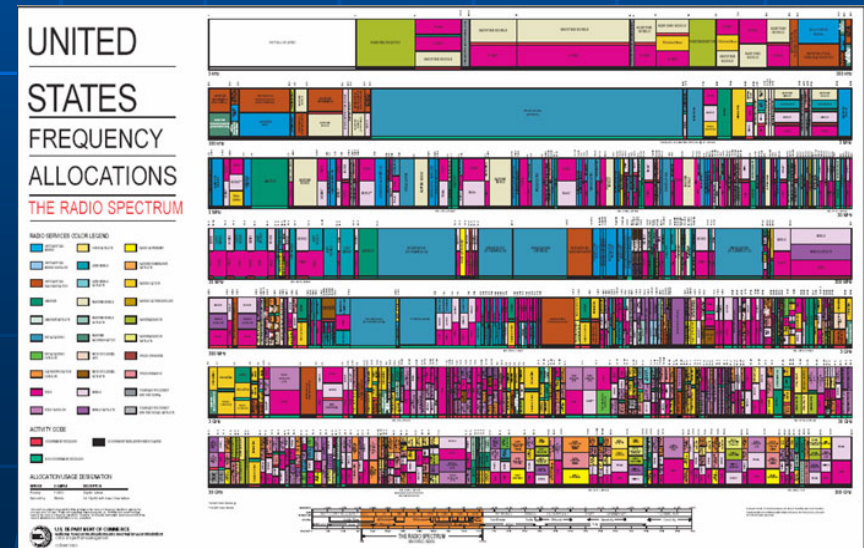
Spectrum Management Reform Contribution of the Technical Community

**International Symposium on Advanced Radio Technologies
Boulder, CO
June 2, 2008**

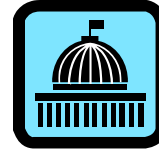
**Karl B. Nebbia
Associate Administrator,
National Telecommunications and Information Administration
Office of Spectrum Management**

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

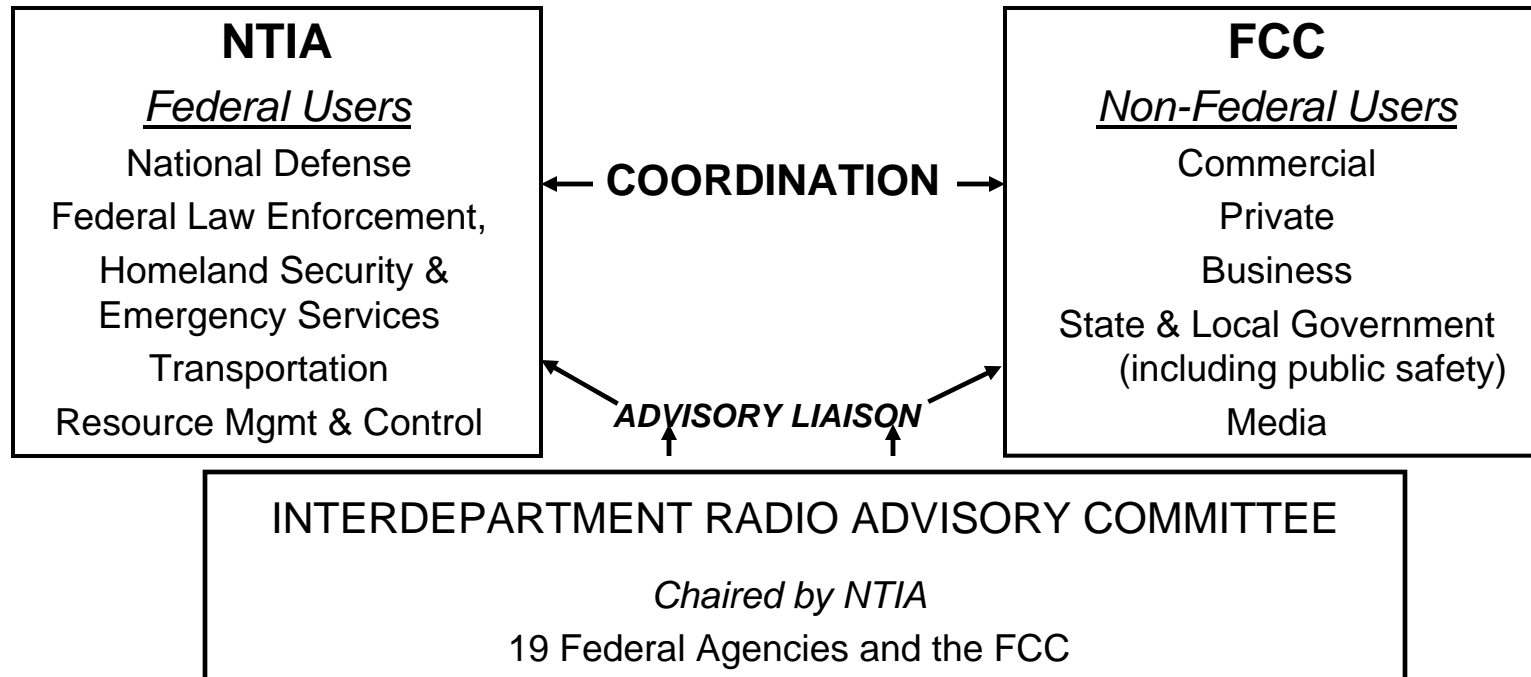


U.S. Spectrum Management Organization



Executive Branch
(President)

Legislative Branch
(Congress)



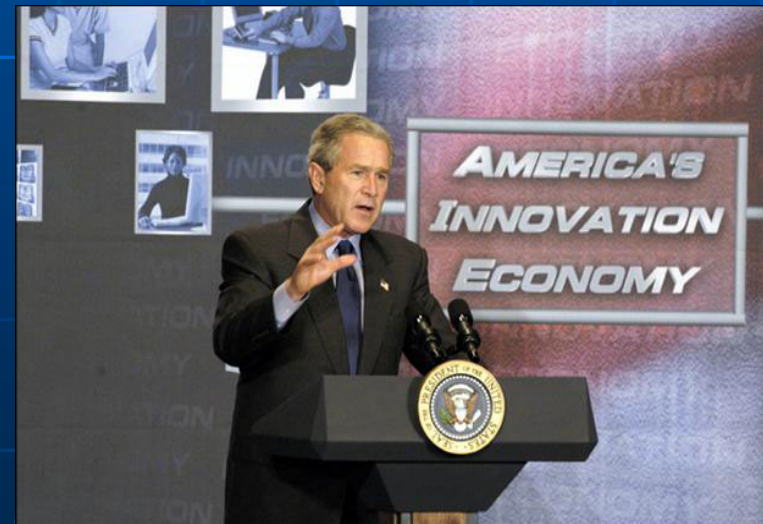
Wireless in Our World – *Requires Spectrum!*



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

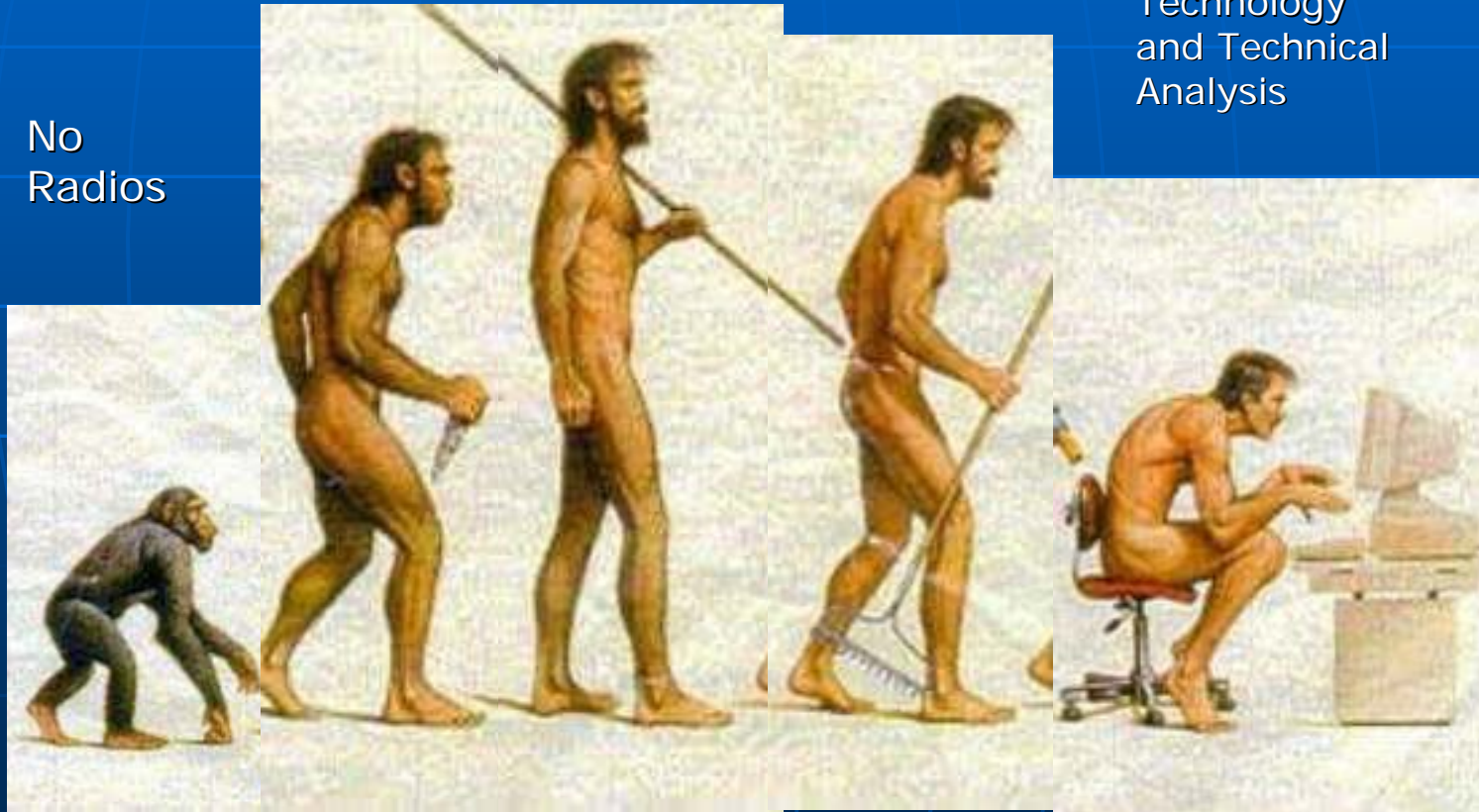
No Spectrum
Management

Manage
by Rules

Manage
by
Markets

Manage by
Technology
and Technical
Analysis

No
Radios





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.