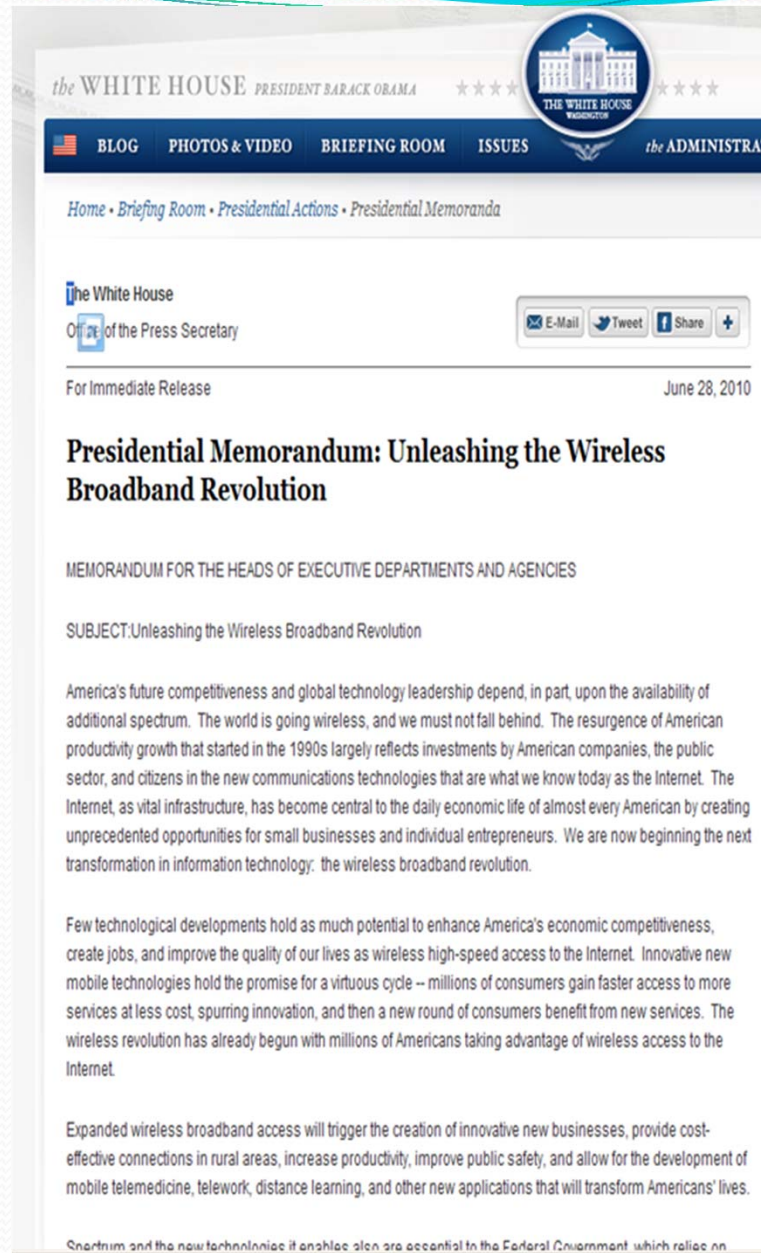


Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth

PCAST May 25, 2012 Update

President Obama and Spectrum Management

- Spectrum important for U.S. economic and technological leadership.
- Requires 500 MHz of spectrum to be cleared for commercial use within 10 years by
 - Finding ways to use spectrum more **efficiently**;
 - Unlocking the value of otherwise **underutilized spectrum**;
 - Open new avenues for spectrum users to derive value through the development of advanced, situation-aware spectrum-**sharing** technologies.
- This PCAST reports proposes the next step to respond to the President's spectrum mandate.



The screenshot shows the White House website interface. At the top, it says "the WHITE HOUSE PRESIDENT BARACK OBAMA" with a logo of the White House. Below that is a navigation bar with links for "BLOG", "PHOTOS & VIDEO", "BRIEFING ROOM", "ISSUES", and "the ADMINISTRATION". A breadcrumb trail reads "Home • Briefing Room • Presidential Actions • Presidential Memoranda". The page is identified as "The White House Office of the Press Secretary" with social media sharing options for E-Mail, Tweet, and Share. The date is "June 28, 2010" and it is marked "For Immediate Release".

Presidential Memorandum: Unleashing the Wireless Broadband Revolution

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

SUBJECT: Unleashing the Wireless Broadband Revolution

America's future competitiveness and global technology leadership depend, in part, upon the availability of additional spectrum. The world is going wireless, and we must not fall behind. The resurgence of American productivity growth that started in the 1990s largely reflects investments by American companies, the public sector, and citizens in the new communications technologies that are what we know today as the Internet. The Internet, as vital infrastructure, has become central to the daily economic life of almost every American by creating unprecedented opportunities for small businesses and individual entrepreneurs. We are now beginning the next transformation in information technology: the wireless broadband revolution.

Few technological developments hold as much potential to enhance America's economic competitiveness, create jobs, and improve the quality of our lives as wireless high-speed access to the Internet. Innovative new mobile technologies hold the promise for a virtuous cycle -- millions of consumers gain faster access to more services at less cost, spurring innovation, and then a new round of consumers benefit from new services. The wireless revolution has already begun with millions of Americans taking advantage of wireless access to the Internet.

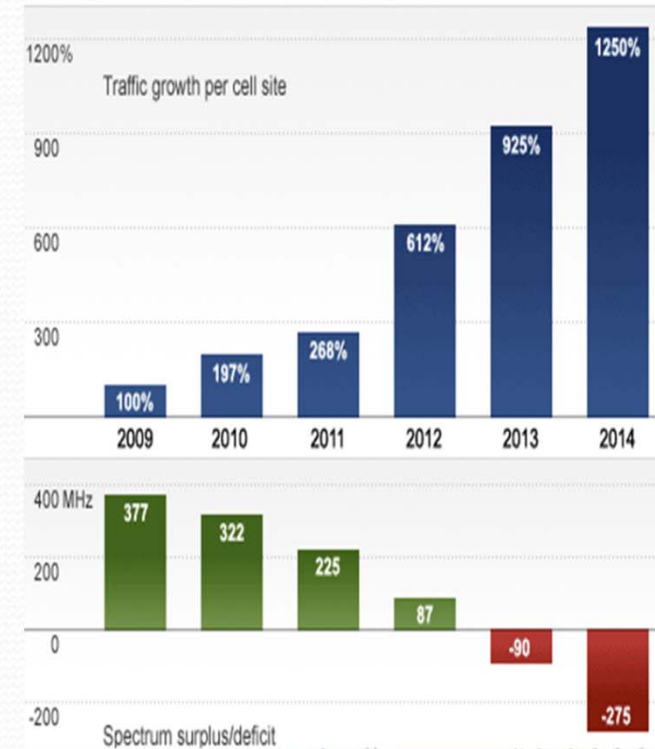
Expanded wireless broadband access will trigger the creation of innovative new businesses, provide cost-effective connections in rural areas, increase productivity, improve public safety, and allow for the development of mobile telemedicine, telework, distance learning, and other new applications that will transform Americans' lives.

Spectrum and the new technologies it enables are essential to the Federal Government, which relies on

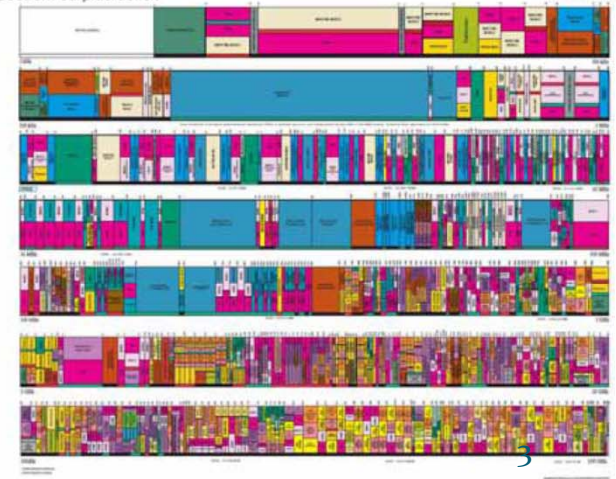
Why Do We Need to Repurpose Spectrum?

- **Huge WW Mobile Device Growth Opportunity (2020)**
 - \$4.5T Global Value
 - M2M Wave next
 - 50B devices
 - Zetta-bytes of Data
- **Enhanced Mobile Devices are Already Leading to a US Spectrum Deficit**
 - Data more than doubled 4 years in a row
 - Smartphones generate 24X data of basic-feature cell phones
 - Tablets create 5X more traffic than smartphones
- **Fragmentation of spectrum** for exclusive Federal use leads to inefficiency, artificial scarcity, and constraints on current and future users.

WIRELESS DATA GROWTH LEADS TO SPECTRUM DEFICIT

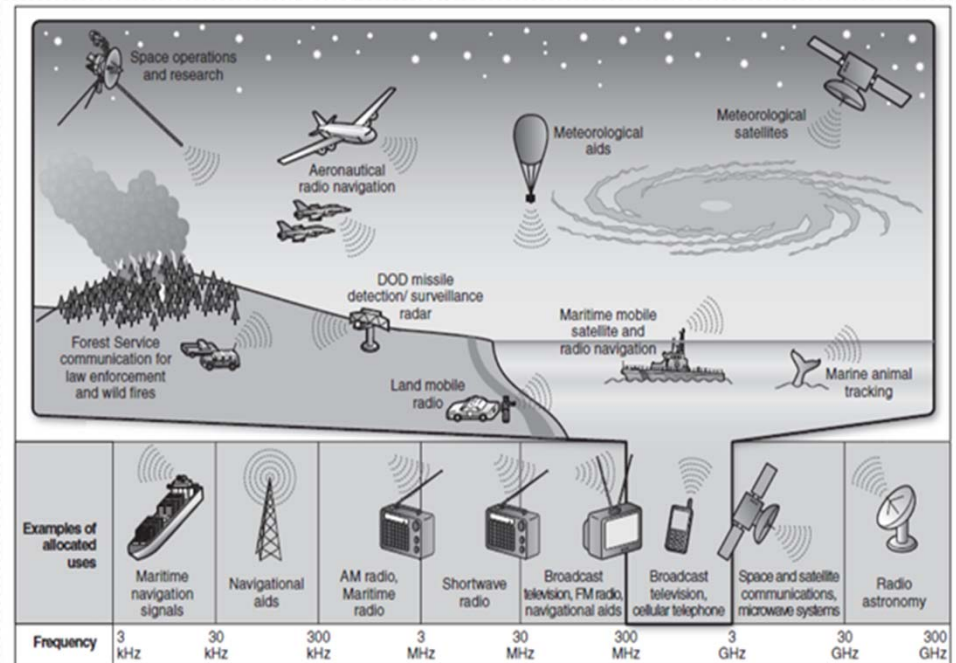


UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

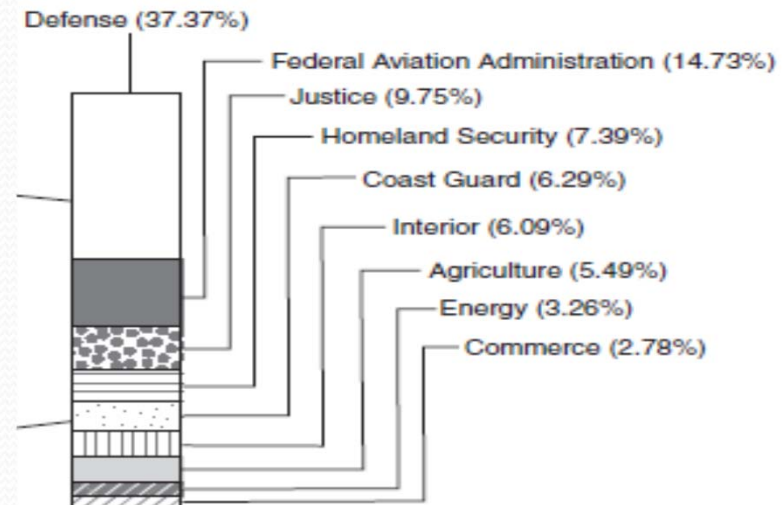


PCAST Study Concentrated on Federal Spectrum

- **Clearing and Reallocation of Federal Spectrum is Not Sustainable.**
 - Recent Study - Clearing of just one 95 MHz band will take 10 years, **cost \$18 billion**, and cause significant disruption.
 - Net revenue from last successful auction of 45 MHz realized a **net income of just \$5.35 billion** for the government.
 - Most Federal Bands not highly valued if they need to be cleared.
- **More Efficient Use of Federal Spectrum will be Obtained through Sharing**

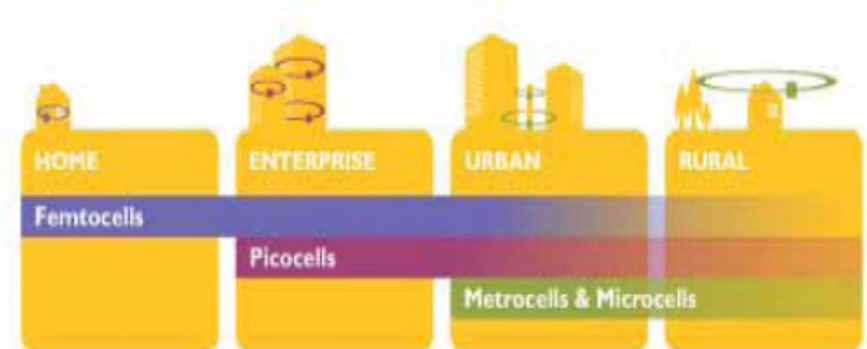


Source: GAO analysis of NTIA, federal agencies, and industry information.



New Technologies Allow for A New Federal Spectrum Policy

- **New Cognitive Technologies**
 - Agile Radios
- **Small Cell Technologies**
 - Optimized for Aggregate Capacity
- **New Spectrum Architecture**
 - Divide spectrum into substantial blocks with common characteristics
 - Make sharing by Federal users with commercial users the norm
 - Make spectrum access available and affordable to a wide range of services and applications.
- **New Metric for Utilization**
 - Measure spectrum effectiveness
 - Potential impact that could be 1,000's times current capacity.



Overarching Recommendation

PCAST recommends the President:

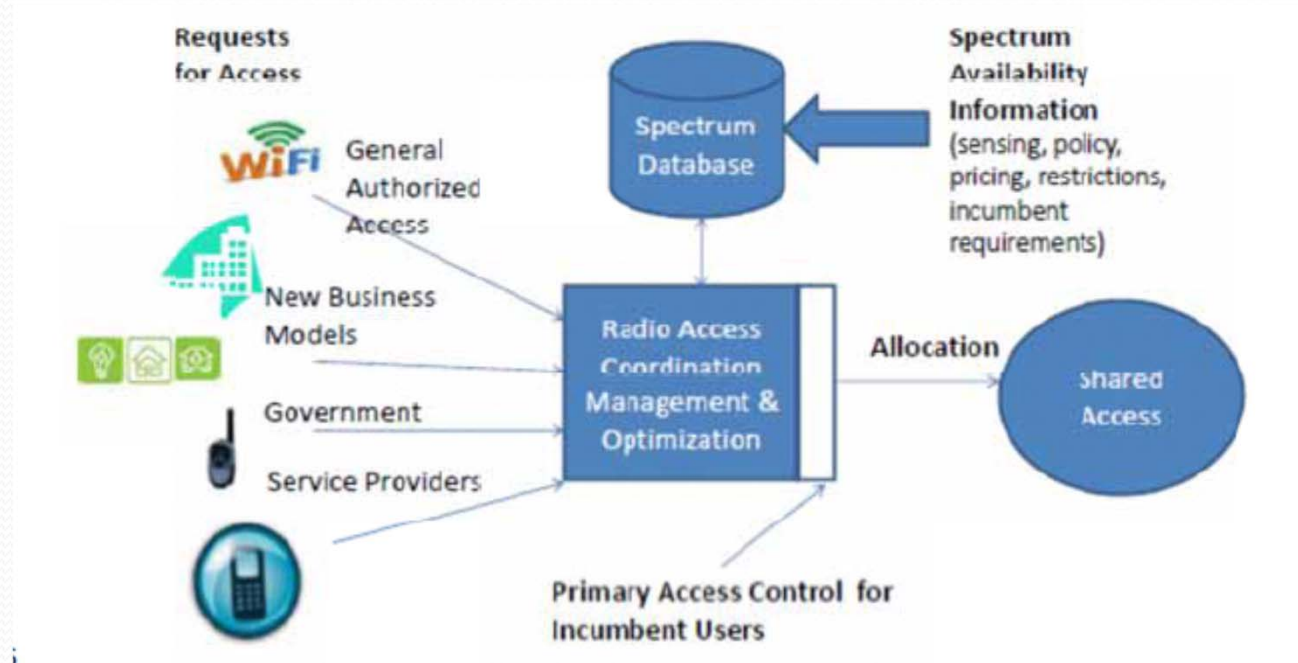
- **issue a new memorandum regarding spectrum;**
- **state the policy of the U.S. government is to share underutilized Federal spectrum; and**
- **identify immediately 1,000 MHz of Federal spectrum for sharing with the private sector.**

This would lead to creation of the first shared-use spectrum superhighways.



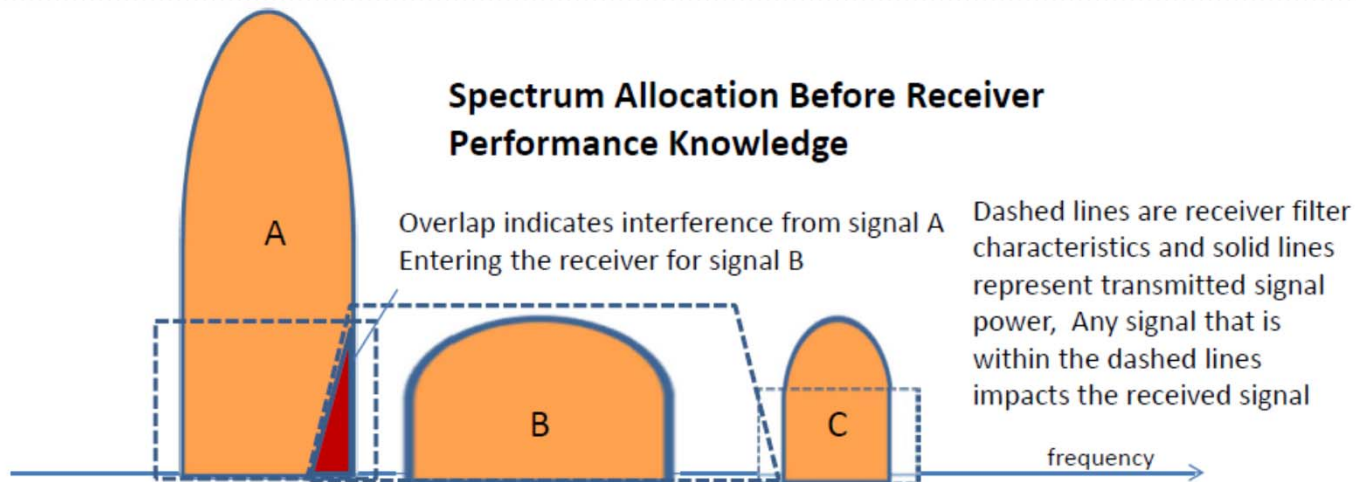
Recommended: New Federal Spectrum Access System

- **Implement a Federal Spectrum Access System**
 - **Hierarchy of Users**
 - **Federal Primary Access (Incumbent)**
 - **Secondary Access (Quality of Service Applications)**
 - **General Authorized Access**
 - **Geo-location Database with policy information**
 - **Sensing option for Federal Systems**
- **Allow Access to Unused Spectrum**

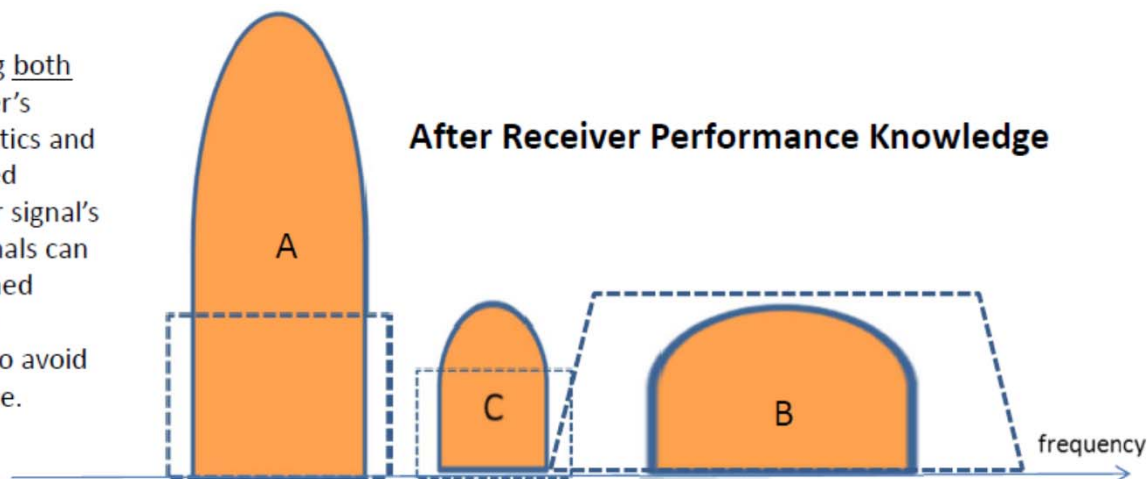


Recommended: Receiver Management Framework

- **Receiver not just Transmitter Focus**
 - Establish minimum technical standards for coexistence of transmitters and receivers to enable flexible sharing. Many ways to consider it.



By knowing both the receiver's characteristics and the received transmitter signal's power, signals can be positioned within the spectrum to avoid interference.



Recommended: Immediate Actions to Get Started

3550-3650 MHz NTIA Exclusion Zones*

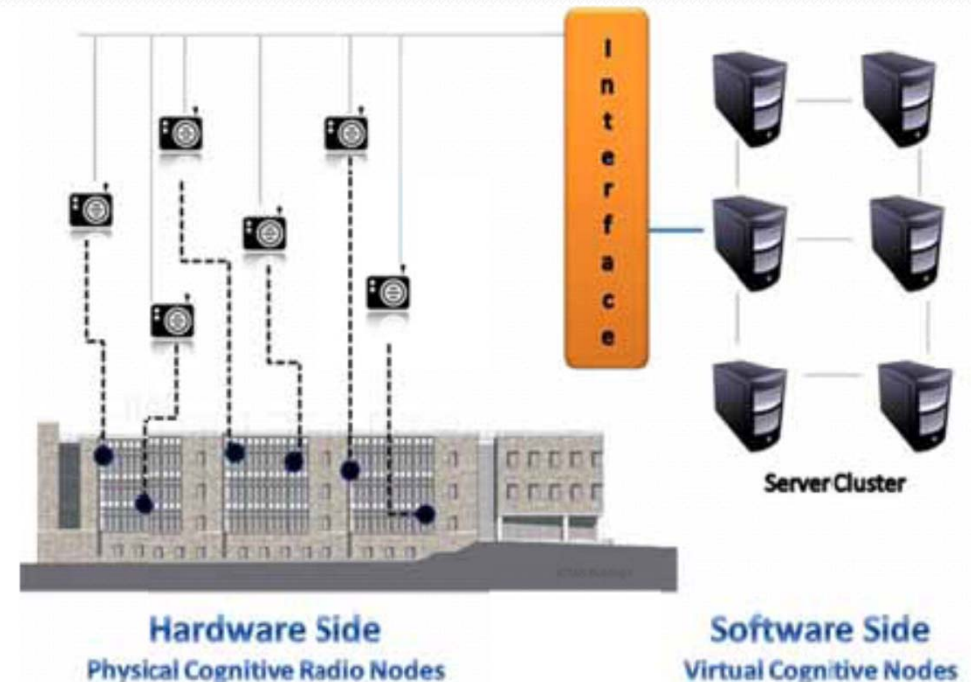
- **Modify Rules to Allow “General Authorized Access” Devices to Operate in two bands in the NTIA Fast Track List – specifically the 3550-3650 MHz (radar bands) and a second band to be determined**
- **Use Extended TV White Space System Already in Operation**



NTIA Fast-Track Report, Figure 5-3. Composite Depiction of Exclusion Zone Distances, Shipborne Radar Systems

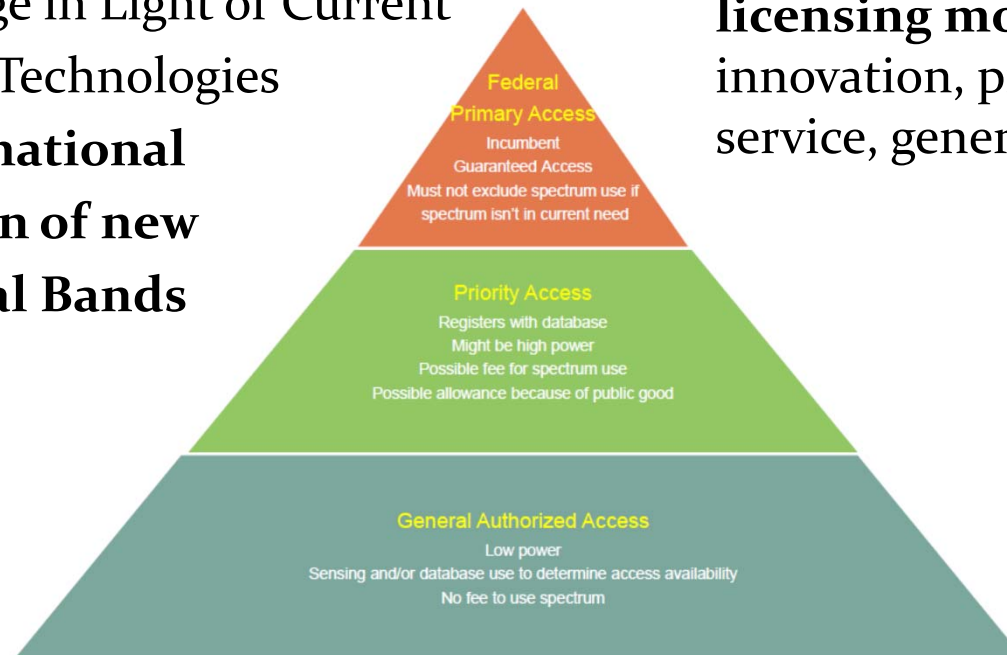
Recommended: Immediate Actions to Get Started

- **Establish Spectrum Sharing Partnership Steering Committee** - an Advisory Committee of Industry Representatives – to Advise on Federal Spectrum Sharing System Implementation
- **Provide Scalable Real-World Test Services** (a Test City and Mobile Test Service) to test Federal Bands and Public Safety
- **Release R&D Wireless Innovation Fund (WIN)** - Appropriated in 2012 Payroll Tax Agreement



Recommendation: Federal Spectrum Management Oversight

- **Formalize the White House-based Spectrum Management Team (SMT)** of the U.S. Chief Technology Officer, National Security Staff, Office of Management and Budget, and National Economic Council to work with the National Telecommunications and Information Administration.
- **Reexamine Partitioning of Federal Spectrum Usage** in Light of Current and Emerging Technologies
- **Support International Harmonization of new Shared Federal Bands**
- **Implement a Mechanism that gives Federal Agencies Incentives to Share Spectrum** (e.g., Spectrum Currency)
- **Redefine Spectrum Relocation Fund to Revolving “Spectrum Efficiency Fund”**
- **Experiment with new shorter-term license economic licensing models** (foster innovation, provide quality of service, generate revenue)



The background is a solid blue gradient, transitioning from a lighter blue at the top to a darker blue at the bottom. The top edge features a wavy, undulating pattern in a lighter shade of blue, creating a sense of movement and depth.

Thank You