Radio Spectrum

The Oxygen for Our Everyday Lives

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National Telecommunications and Information Administration
Overview

• Spectrum – what is it?
• Spectrum Management
• Spectrum for New Services
• Spectrum Sharing
Wireless Systems Require Spectrum
Radio Signal Basics

Electromagnetic Waves

- Long wavelength: low frequency, low energy
- Shorter wavelength: higher frequency, higher energy
What is Spectrum?

- Radio frequencies – 10 kHz to 300 GHz
- A finite but renewable public resource
- Not confined within national borders
- Used and managed by international treaties and national policies
- Vital to economic, social and cultural life
- Critical for essential government missions and public services

Spectrum must be managed to ensure efficient, equitable and optimum access for the services that use it.
National Spectrum Management

The President

Communications Act of 1934

Congress

NTIA Organization Act

NTIA

Federal Users

FCC

Non-Federal Users

Coordination

- FCC-NTIA MOU
- ITU preparation

Interdepartment Radio Advisory Committee
Chaired by NTIA
19 federal agency members

Policy and Plans Steering Group
Chaired by NTIA Assistant Secretary
Federal agencies plus FCC and the White House

Federal Users

Non-Federal Users

Advisory

Liaison

NTIA Manual

FCC Rules
(47 CFR Parts 0-199)

47 CFR Part 300

U.S. Department of Commerce · National Telecommunications and Information Administration
National Spectrum Allocations
### Spectrum Allocations 101

**International Allocations (ITU/WRC)**

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>941-1525 MHz (UHF)</td>
<td>Aeronautical Mobile (R) 5.327A, Aeronautical Radionavigation 5.328</td>
</tr>
<tr>
<td>1215-1300 MHz</td>
<td>Earth Exploration-Satellite (active), Radiolocation 5.326A, Space Research (active)</td>
</tr>
<tr>
<td>1300-1350 MHz</td>
<td>Aeronautical Mobile, Radiolocation 5.337, Space Research (active), Radiolocation G2</td>
</tr>
</tbody>
</table>

**Domestic Allocations (FCC & NTIA)**

<table>
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<tr>
<th>Frequency Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>941-944 MHz</td>
<td>Fixed, US998 US301 02</td>
</tr>
<tr>
<td>144-460 MHz</td>
<td>Fixed, US998 US301 N330 N3120</td>
</tr>
</tbody>
</table>

**Footnotes**

- **Fed/Non-Fed**
- **Fed Excl**
- **Non-Fed Excl**
- **Shared**
International Spectrum Management

- International Telecommunications Union (ITU)
- Harmonization and economies of scale
- U.S. Government international operations
- International operations and commitments for space communications and science, aviation, maritime, weather prediction
- National sovereignty of member states
High Demand for Spectrum Access

Driven by demand for mobility, digital, and new services. The "beachfront property below 3 GHz is already used heavily."
Demand for Mobile Continues to Grow

Data-Hungry Devices

- The global mobile economy totals $1.6 trillion, or about 2% of the world’s GDP. Mobile technology is a significant contributor to annual global economic growth, adding up to 0.39% to GDP and hundreds of thousands of new jobs.
- Mobile data traffic in the U.S. is projected to grow seven-fold from 2014 to 2019, a compound annual growth rate of 47%.

The Internet of Things (M2M) is In Its Infancy

- LTE connected vehicles; smart grid; health care; appliance control; connected advertising, etc.

Spectrum is key to growth and innovation in a wide range of industries and government applications.
Recently concluded AWS-3 auction:
- Paired 2110 MHz - 2155 MHz with 1755 - 1780 MHz;
- Unpaired 1695 – 1710 MHz

Relocation or sharing with numerous federal operations

“Heavy Duty” engineering
- Identify relocation bands
- Sharing: realistic vs. worst case

Required close collaboration

Federal Incumbent Systems:
- Fixed Point-to Point Microwave
- Military Tactical Radio relay
- Air Combat Training System
- Precision Guided Munitions
- Tracking, Telemetry & Commanding
- Aeronautical Mobile Telemetry
- Video Surveillance
- Unmanned Aerial Systems
- Other Systems

Over $41B in net bids funding key Administration priorities
Incumbent Access: Includes authorized federal and grandfathered Fixed Satellite Service (FSS) users currently operating in the 3.5 GHz Band.

Priority Access: Authorize certain users to operate with some interference protection in portions of the 3.5 GHz Band at specific locations.

General Authorized Access: Users would be authorized to use the 3.5 GHz Band opportunistically within designated geographic areas. GAA users would be required to accept interference from Incumbent and Priority Access tier users.
Sharing is critical to improving spectrum access
Center for Advanced Communications (CAC)

- Focal point for accelerating the development and deployment of spectrum sharing technologies that increase both Federal and commercial spectrum access
- Impartial testing and evaluation of new spectrum sharing technologies
- One-stop shop for coordinating access to federally owned, operated or funded spectrum test facilities
- Enables sound policy changes driven by scientifically sound tests and evaluations
Spectrum Management

Economics

Law

Policy

Technology

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Questions?

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