

The President's Broadband Vision and the Proliferation of Wireless Broadband Technologies

“Moore Meets Marconi: Spectrum Policy for the 21st Century”

Law Seminars International

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Overview

- State of the Economy
- The President's Broadband Vision
- Proliferation of Wireless Broadband Technologies



Overarching Goal: Promoting Economic Growth

- Thanks to the President's policies, America's economy is strong:
 - U.S. economy grew at a real GDP rate of 3.3% in the second quarter of 2004 (revised upwardly from 2.8%); over the last four quarters, GDP has risen at a robust 4.8% rate - one of the strongest yearly readings in 20 years.
 - Over the last year, 1.7 million new jobs have been created – more than Germany, Japan, Great Britain, Canada and France combined – including 107,000 in the manufacturing sector since January.
 - The U.S. unemployment is 5.4%, while unemployment rate in Europe was 9.0%.
 - There has been a sharp pickup in business spending on capital equipment.
 - Homeownership is presently at its highest level ever – 69.2 % in the first quarter of 2004.
 - Productivity in the non-farm business sector rose an estimated 5.5% in 2003, following a 4.4% gain in 2002 – the first time in the past 50 years that annual productivity gains have exceeded 4% in two consecutive years.
 - In May 2004, the Department of Agriculture forecasted that U.S. agricultural exports would set a new record in 2004, totaling an estimated \$61.5 billion.
 - In August 2004, manufacturing activity rose for the 15th month in a row.

The President's Broadband Vision

Goal

"This country needs a national goal for broadband technology . . . universal, affordable access for broadband technology by 2007."

— President George W. Bush, Albuquerque, NM, March 26, 2004

Government's Role

"The role of government is not to create wealth; the role of our government is to create an environment in which the entrepreneur can flourish, in which minds can expand, in which technologies can reach new frontiers."

— President George W. Bush, Technology Agenda, November, 2002.

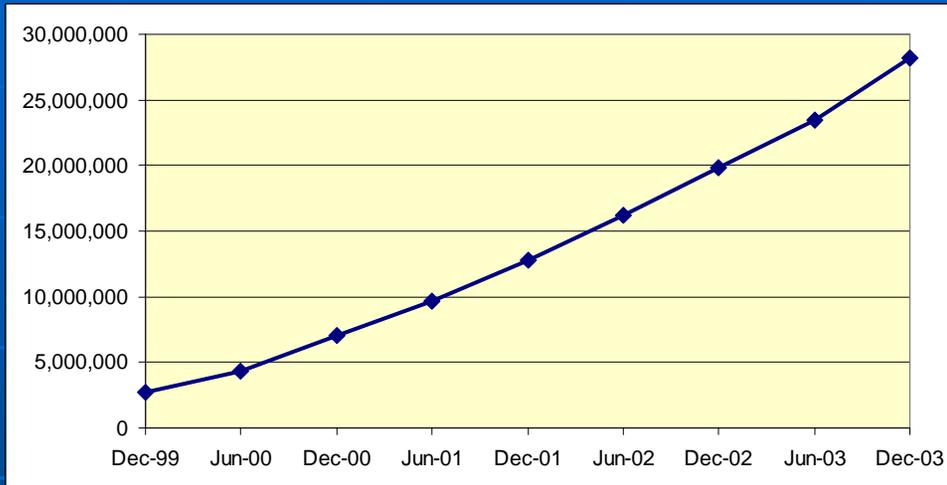
Creating Economic Conditions For Broadband Deployment

“We ought not to tax access to broadband. If you want something to flourish, don’t tax it.”

– President George W. Bush in Baltimore, Maryland on April 27, 2004

- Tax relief has given businesses powerful incentives to invest in broadband technology
 - Accelerated depreciation for capital-intensive equipment
 - Extension of the Internet tax moratorium; support making the moratorium permanent
 - Extension of the research and experimentation tax credit; support making it permanent
 - President's FY 2005 budget requests a record \$132 billion for research and development.

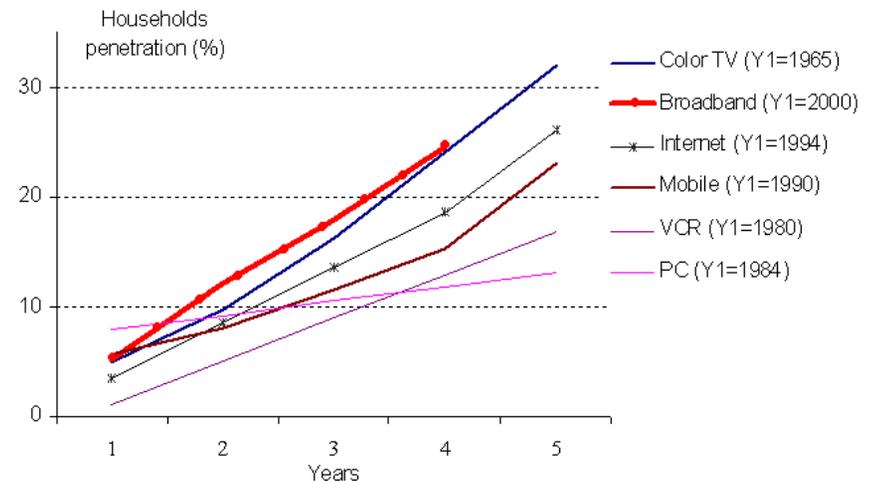
Total High Speed Lines in the U.S.



Source: FCC, 2004

Rate of Broadband's Diffusion is Strong

United States: Diffusion of consumer goods
and communications services (5 %
onwards)



Source: OECD

Removing the Regulatory Underbrush

Improving Access to Rights-of-Way:

“[B]roadband providers have trouble getting across federal lands...that’s why I signed an order to reduce the regulatory red tape for laying fiber optic cables and putting up transmission towers on federal lands.”

– President George W. Bush, U.S. Department of Commerce, June 24, 2004

- A Federal Rights-of-Way Working Group set out recommendations to improve access to rights-of-way management across federal lands to promote the deployment of broadband. The called for improvements in: (1) Information Access and Collection, (2) Timely Processing, (3) Fees and Other Charges, and (4) Compliance.
- On April 26, 2004, the President signed an executive memorandum directing federal agencies to implement these recommendations.

Reducing Legacy Regulation of Broadband Services:

- The Administration supports the FCC’s order freeing newly deployed broadband infrastructure from legacy regulation

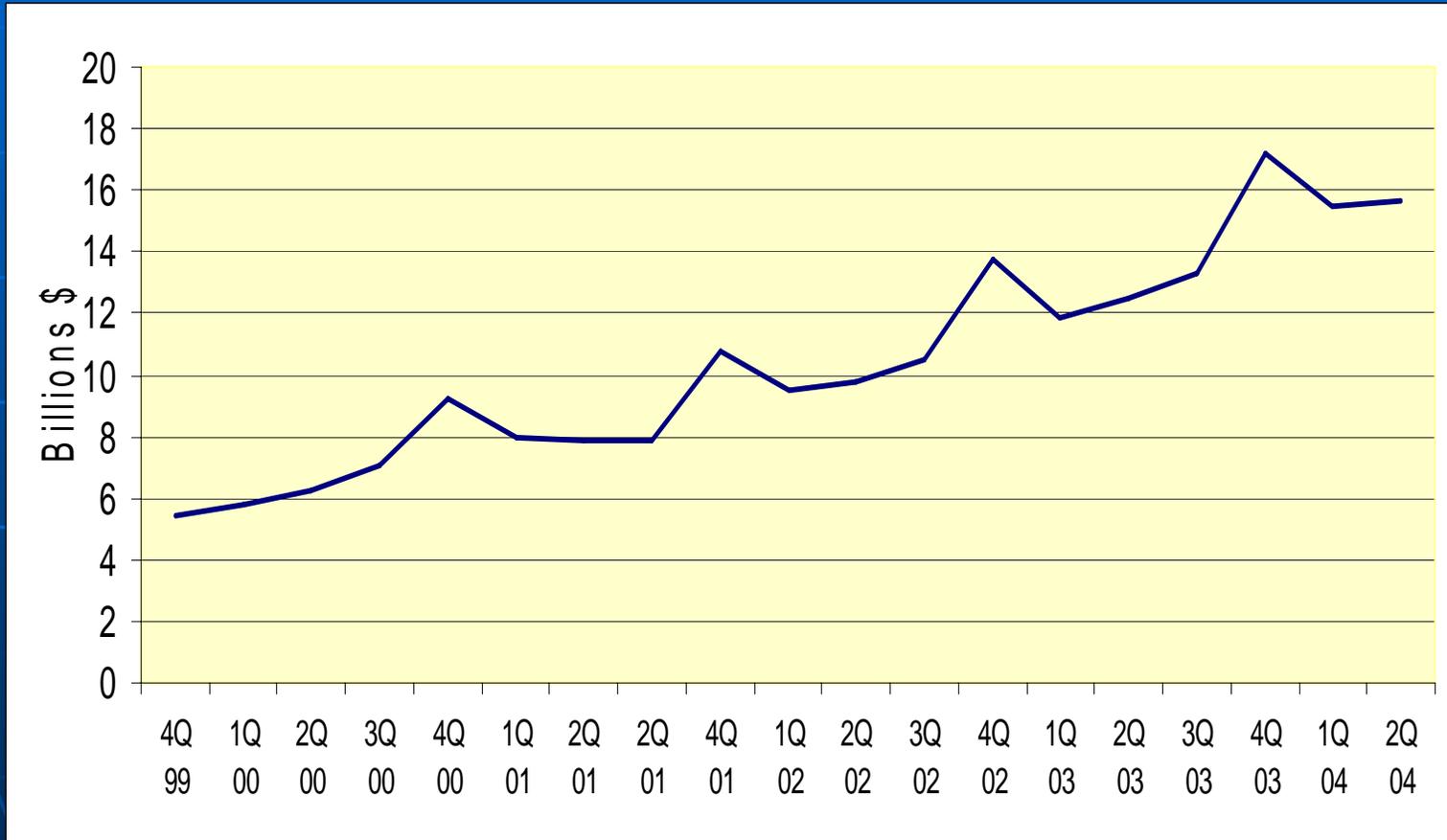
Fiber Deployment

- Verizon plans to spend nearly \$2.5 billion to deploy fiber to more than three million homes by the end of 2005. Their fiber system will transmit data 20 times faster than DSL and six times faster than cable-modems. Verizon will offer service with speeds ranging from 5mbps to 30mbps. Verizon also plans to offer video services beginning in 2005.
- SBC recently announced plans to spend \$4 to \$6 billion over the next five years to deploy fiber to neighborhood hubs. SBC plans to provide video on demand and high-definition TV and is working with Microsoft to test their new IPTV technology.

The Growth of E-Commerce

Estimated Quarterly U.S. Retail E-commerce Sales:

4th Quarter 1999 – 2nd Quarter 2004



Source: U.S. Census Bureau, 2004

Broadband Over Power Lines: The Third Wire

“We need to get broadband to more Americans . . . one great opportunity is to spread broadband throughout America via our power lines.”

— President George W. Bush, US Department of Commerce, June 24, 2004

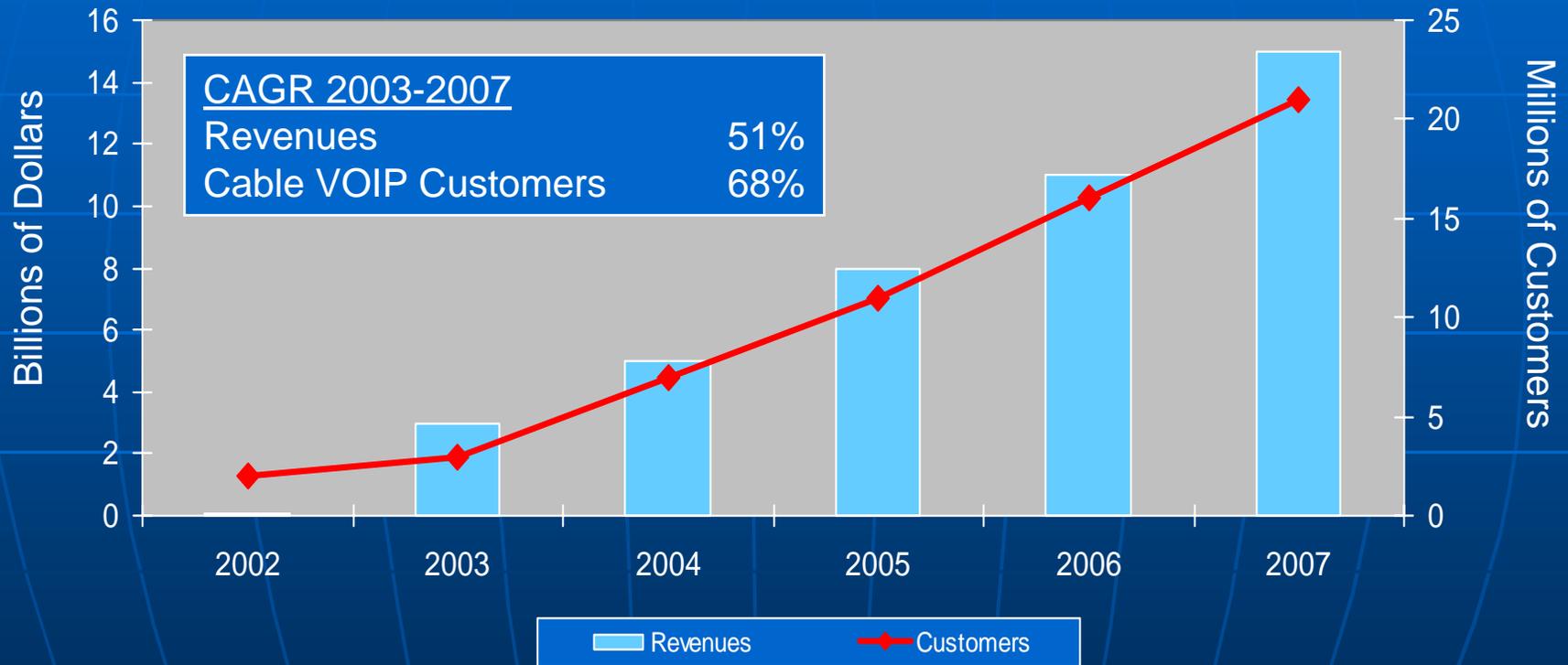
- Principal concern is the risk that BPL systems might interfere with federal government radio communications or other state and private radio operators.
- FCC began BPL rulemaking on February 12, 2004.
- On April 27, 2004, NTIA submitted to the FCC a Phase 1 interference report, which suggested interference mitigation techniques to protect critical government radio systems.
- On June 4, 2004, based on additional analyses, NTIA recommended several supplements to the FCC proposed BPL rules to reduce further any risk of harmful BPL interference



HomePlug Modem
can turn an electrical
outlet into an
Internet connection.

VoIP and Other IP Applications Will Continue to Change the Market

Cable VoIP Market



Source: Kaufman Brothers, "A General Flavor of Mild Decay," July 14, 2003

The Spectrum Challenge

A Presidential Policy Board examining spectrum management summed up the urgent issues in stating:

"The development of so valuable a resource as the radio spectrum is a matter of paramount importance. Despite technical and operational improvements the demand for frequencies has steadily crowded the supply within the usable spectrum. The use of this resource should have the most careful planning and administration within the United States and in cooperation with other countries. Unfortunately, guidance and administration have often been inadequate."

The Spectrum Challenge (cont'd)

- The statement on the previous slide sums up today's situation pretty well... except it was written in 1951 by President TRUMAN'S policy board.
- A Johnson Administration report in late 1968 observed the "remarkable" growth in spectrum use and resulting problems and inefficiencies caused by an inflexible block allocation system among other things. It called for greater use of economic factors, and, echoing a Commerce Department advisory board report called "The Silent Crisis," cautiously raised the idea of a market system and possibly license fees related to the amount of spectrum used.
- The General Accounting Office has visited spectrum issues more than once, including a report in 1974 that discussed the views of economists that advocated the use of market forces for spectrum management.
- In 1991, NTIA released its own comprehensive review of spectrum management, which among other things called for greater use of market forces.

Moore Meets Marconi: Wireless Broadband and New Technologies

"The other promising new broadband technology is wireless. The spectrum that allows for wireless technology is a limited resource . . . [a]nd a wise use of that spectrum is to help our economy grow, and help with the quality of life of our people."

-- President George W. Bush, June 24, 2004

The Administration has made more radio spectrum available for wireless broadband technologies:

- Advanced Wireless Services ("3G")
- Ultra-wideband
- 5 GHz Spectrum
- 70/80/90 GHz

Advanced Wireless Services (“3G”)

- Third generation (3G) is an ITU specification for high-speed wireless communications. This worldwide wireless connection is compatible with GSM, TDMA, and CDMA. Carriers worldwide are now in the process of deploying 3G network infrastructure across urban, suburban and highly trafficked rural areas.
- Next-generation 3G cellular services will create broad-range coverage of data across wide geographic areas, providing the greatest mobility for voice communications and Internet connectivity. The 3G service will enable highly mobile users with laptops and other wireless data device to bridge the gap between higher bandwidth WiMax hot zones and Wi-Fi hot spots.
- New devices optimized for 3G communications are beginning to reach the marketplace. Such devices include cell phones that can also provide interactive video conferencing, as well as PDAs that can provide full-playback DVD services.

EvDO & UMTS

- EvDO provides wireless data connections that are up to 2.4 megabits per second in some trials; 60 percent faster than cable modem service.
- EvDO has been deployed in a number of markets, including the Washington DC area; San Diego, CA; Sioux City, IA; and Grand Forks, ND.
- EvDO can work over existing cell phone networks and deliver a connection there is a mobile phone signal.
- Similar UMTS deployments by GSM carriers (e.g. AT&T Wireless)

Ultra-Wideband (UWB)

- The primary standard involving UWB is the high data rate wireless Personal Area Network (PAN) or IEEE 802.15.3 that could reach data rates of 480 Mbps at 1 meter, or 110 Mbps at up to 10 meters.
- Proposals for the 802.15.3 Physical and Media Access Control standards have been made by Motorola and the Multiband OFDM Alliance (MBOA) which includes 120 companies such as Intel and Texas Instruments.
- There is a wide range of perspectives on the future market size and growth potential of UWB technology. Some see 274 million chipsets by 2007, while others see only 24 million by this time. A recent report by Parks Associates predicts that there will be 150 million UWB devices by 2008.

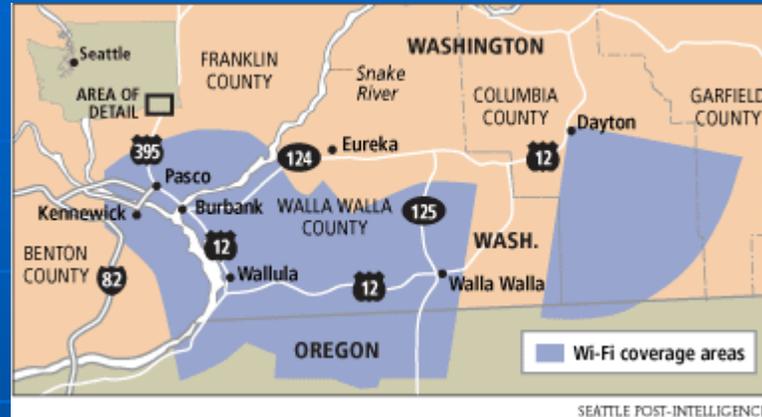
Wi-Fi

- IEEE 802.11 or Wi-Fi operates in the 2.4 GHz or 5 GHz frequency range and offers a maximum data throughput of 108 Mbps with ranges that vary from 50 meters for low-gain antennas up to 8 kilometers for high-gain antennas.
- Currently the Wi-Fi Alliance has over 200 member companies from around the world, and has over 1250 products have received Wi-Fi certification since certification began in March of 2000.
- Wi-Fi packages sold 12 million units in 2003 and are on pace to double this year. An estimated 99 million people will have Wi-Fi enabled technology by 2006.
- Developing strong Fee-for-Service model (Airports, Hotels, etc.).
- The spectrum made available for Wi-Fi usage at 5 GHz is a model for sharing between industry and government.

Wi-Fi Hot Spots

- There are over 20,000 hotspots in the United States. (Intel's Hotspot Finder)
- City-wide hot spots:
 - Cerritos, CA
 - Athens, GA
 - Chaska, MN
 - Oklahoma City, OK
 - Spokane, WA
 - Walla Walla, WA
- Some Communities developing major free hot spots:
 - Long Beach, CA
 - San Jose, CA
 - Washington, DC
 - Las Vegas, NV
 - New York, NY
 - Austin, TX

Wi-Fi in Walla Walla



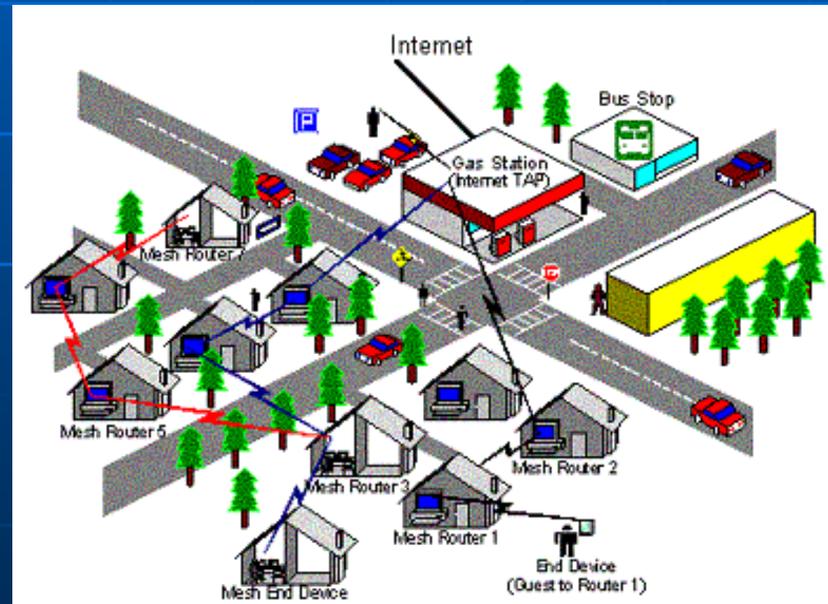
- One of the largest rural wireless Internet networks in America was recently deployed in parts of Walla Walla, Columbia, Franklin, Benton and Umatilla counties.
- At 1500 square miles, the network is 10 times larger than the proposed city-wide network in Philadelphia, PA (135 miles) and is bigger than the state of Rhode Island.
- The estimated initial cost of the project is \$7 million to \$10 million.

Wi-Fi Telephony

- Until recently, the utility of Wi-Fi phones was limited to businesses and colleges that had set up Wi-Fi in a building or on a college campus.
- As Wi-Fi “hot zones” continue to proliferate, Wi-Fi phones may grow to become a viable alternative to both wireline and traditional wireless telephony.
- ABI Research predicts the Wi-Fi voice market may be as much as \$20 million by 2009.

Unlicensed Mesh Networking

- Leveraging the unlicensed bands of 802.11, mesh technology can deliver high bandwidth at an order of magnitude lower cost than existing cellular technologies.
- Mesh architecture permits the extension of wireless coverage to areas that do not have cabling infrastructure.
- In these situations, mesh access points integrate with existing WLAN access points to extend Wi-Fi coverage to areas not readily accessible by cables.
- The IEEE 802.11 Working Group has formed a study group to explore establishing an industry-recognized standard for wireless mesh networking.



Self-Organizing Neighborhood Wireless Mesh Networks
(Source: Microsoft Research)

WiMax

- WiMax or 802.16 is designed to provide wireless broadband access in a Metropolitan Area Network (MAN), operating at speeds up to 75 Mbps over a 30 mile radius.
- WiMax connectivity is fast enough to support more than 60 businesses with T1-level connections and hundreds of homes with DSL-rate connectivity using only 20 MHz of channel bandwidth.
- Intel plans to build WiMax into its Centrino chip platforms, which power 80% of all PCs, by 2006. Motorola plans to commercially offer integrated radio access networks that can handle 3G, Wi-Fi, WiMax and other future wireless innovations. AT&T, Siemens, and Alcatel are also backing WiMax technology.
- Industry analysts predict six-fold growth in WiMax sales over the next three years.

70/80/90 GHz: Web-based Coordination with the Department of Defense

- NTIA has been moving ahead with plans to establish a web-based mechanism to facilitate real-time coordination of federal and non-federal operations in these frequency ranges.
- This new system will allow non-federal users to use a website to determine whether they have any potential conflict with federal users.
- NTIA will soon have its mechanism operational. This mechanism has been under test by staff and the perspective non-federal database managers since June. The FCC has selected the database managers, and these organizations are developing their databases and the mechanism used to “shake hands” with NTIA.

Spectrum Policy for the 21st Century

- On June 24, 2004, the Department of Commerce released two spectrum reports with recommendations to develop a U.S. spectrum policy for the 21st century.
- Highlights of the Recommendations in the two reports:
 - Encourage Innovation and New Technologies
 - Modernize the Spectrum Management System
 - Establish Economic and Efficiency Incentives
 - Ensure the Protection of Critical Government Spectrum Users and Services

Spectrum Report Recommendations

OBJECTIVE A: Facilitate A Modernized & Improved Spectrum Management System

- Consistent Methods for Assessing New Technologies
- Best Practices Handbook
- Application of Information Technology
- Career Development Program
- Spectrum Management Advisory Committee
- International Spectrum Management Policies
- Spectrum Management Tools for Coordinating New Services and Managing Interference
- Spectrum Management Training

Spectrum Report Recommendations

OBJECTIVE B: Facilitate Policy Changes To Create Incentives For More Efficient & Beneficial Use Of Spectrum & To increase Predictability & Certainty For Incumbent Spectrum Users

- Capital Planning Process
- Technical Planning Process
- Use of Efficient Technologies for Effective Radiocommunications
- Incentives for Use of Efficient Radiocommunication Systems
- Economic and Regulatory Incentives

Spectrum Report Recommendations

OBJECTIVE C: Develop Policy Tools to Streamline Deployment of New & Expanded Services & Technologies While Preserving National & Homeland Security & Public Safety, & Encouraging Research

- National Strategic Spectrum Plan
- Facilitation of Interoperability & Continuity of Government Communications
- Spectrum Sharing Innovation Test-Bed
- Characterization of New Technology & Expanded Services & Their Impact
- Emerging Technologies and Innovation
- Information Technology to Modernize Spectrum Management

Spectrum Report Recommendations

OBJECTIVE D: Develop Means to Address the Critical Spectrum Needs of National & Homeland Security, Public Safety, Federal Transportation Infrastructure & Science

- Policy & Plans Steering Group (PPSG)
- Policy Coordinating Committee (PCC)
- Formalize Arrangement with FCC Defense Commissioner
- Long-Range Spectrum Planning
- Unsatisfied Spectrum Requirements for Public Safety

Much More to Come...

- SDR
- Cognitive Radio
- Smart Antennae
- DARPA “XG” Project
- RFID