Economic Security and National Security:
Next Steps for the President's Spectrum Initiative

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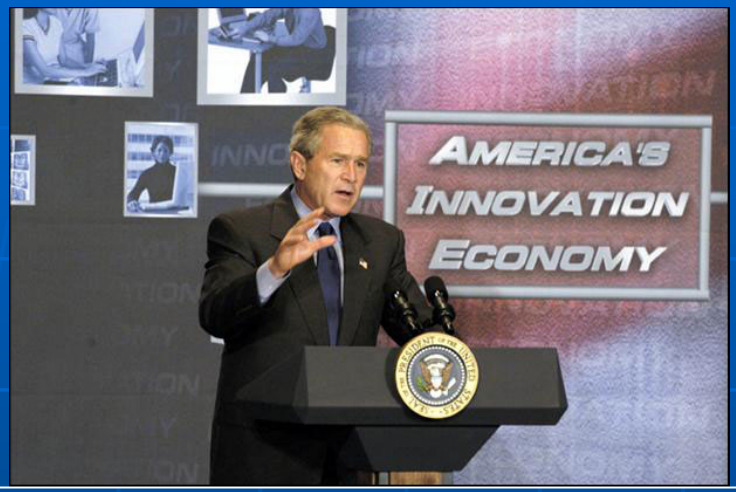
Overarching Goal: Promoting Economic Growth

Thanks to the President's policies, America's economy is strong:

- GDP grew 3.3% in Q205 and 3.6% during the past 4 quarters, above the averages of the past 3 decades. During the past 4 quarters, EU25 GDP grew 1.3% and euro-zone GDP grew 1.2%.
- The markets have added approximately $4.4 trillion in new wealth since January 2003.
- Nearly 2.2 million jobs have been created over the past 12 months and 1.5 million since January 2001. Over 4.2 million have been added since May 2003.
- From December 2000 to December 2004, productivity grew at its fastest 4-year rate in over 50 years.
- Manufacturing activity (ISM index) has been growing for 28 straight months.
- National homeownership was 68.6% in 2Q05, near its record high of 69.2% in 4Q04.

The President's Broadband Vision



President Bush speaking at the U.S. Department of Commerce June 24, 2004

"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

Technology's Evolution

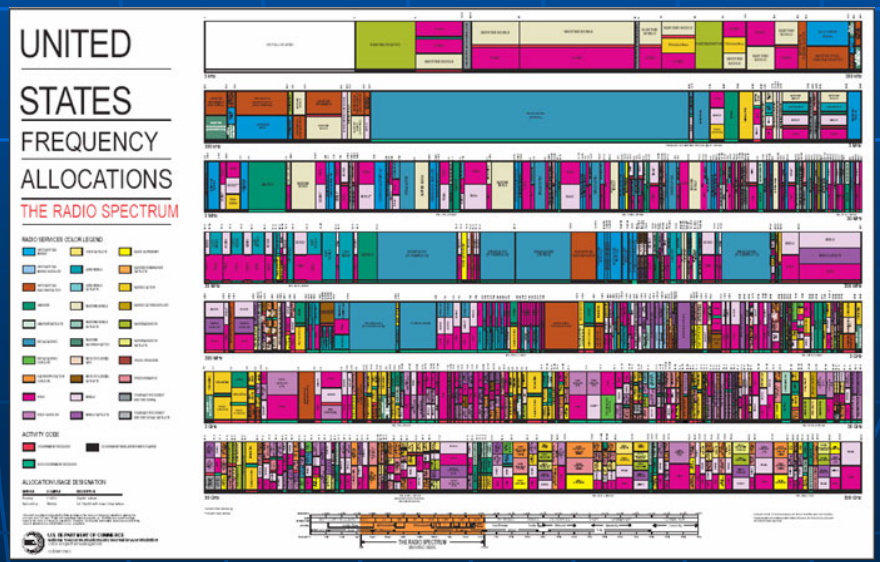
- **1971** → World's first microprocessor developed
- **1973** → Cell phones invented, available to the public in 1977
- **1985** → 599 cell sites
- **1993** → 52MB additional RAM for PCs cost $1800
- **1992** → Digital cellular telephone system
- **1995** → 257 million personal computers (PC) in use worldwide; average PC cost $1500 (including peripherals)
- **1999** → 375 million wireless subscribers worldwide (76 million U.S. subscribers)
- **2000** → More people watch cable television than broadcast channels
- **2002** → Wireless subscribers surpass fixed telephone line subscribers
- **2004** → Broadband subscribers surpass dial-up subscribers; more chips sold for PC use than business use
- **TODAY** →
  - 1.4 billion wireless subscribers worldwide (194.5 million U.S. subscribers)
  - 178,025 cell sites
  - Smart phones bundled with Internet, email, text messaging, MP3 player, ring tones, digital camera, video/video messaging, and location capability
  - PDAs incorporate Wi-Fi and Bluetooth technologies (i.e. Hewlett Packard IPAQ x2000)
  - 820 million PCs in use worldwide – projected to surpass 1 billion by 2007
  - Average PC cost $841(including peripherals) – dell.com desktops start at $379
  - RAM costs less than one-hundredth what it did in 1993

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



Wireless Applications Expanding Competition

- **Wi-Fi:** Airgo Networks announced plans to sell Wi-Fi chips with data rates up to 240 Mbps by 4Q05 – almost 4x the speed of current Wi-Fi chips. Rural Oregon is home to the world's largest Wi-Fi hotspot → 700 miles^2.
- **WiMax:** Intel plans to build WiMax into its Centrino chip platforms, which power 80% of all PCs, by 2006. InStat/MDR estimates that a company could reach 97.2% of the U.S. population with a $3.7 billion investment in WiMax.
- **Unlicensed Mesh Networking:** Mesh architecture extends wireless coverage to areas without wire infrastructure, and can link diverse devices or networks.
- **HSPDA:** Faster version of GSM AWS (1.8 Mbps, over time can be boosted to 7.2 Mpbs), expected to reach the mass market in 2006 → launching first in the U.S, followed by Japan, then Europe.
- **CDMA2000 1xEV-DO Revision A:** Increases the efficiency, capacity and data speeds (3.1 Mbps forward link/1.8 Mbps reverse link) of existing EV-DO networks → commercially available in 2006.

Emerging Technologies Will Facilitate More Sharing Between Spectrum Users

- Software Defined Radio
  - Cognitive radios
- Smart Antenna Systems
  - Highly directional antennas (fractal antennas)
- Use of coding technologies, including coding combined with advanced modulation
- Greater utilization of multiple domains
- Orthogonal Frequency Division Multiplex (OFDM) such as that used by satellite radio systems

The Goal: Increasing bits transmitted per Hz per km² at lowest unit cost

5 GHz: Promoting Broadband While Protecting Government Users

- Increasing use of wireless local area networks (Wi-Fi) necessitated additional bands for operation to support broadband users
- Extensive cooperation between NTIA, government users (DOD), FCC and private sector developed technical sharing rules to enable co-frequency operation between unlicensed Wi-Fi employing Dynamic Frequency Selection (DFS) and government radar systems
- Ongoing dialogue continues to ensure that, as Wi-Fi expands into upper part of 5 GHz band, technical means of protecting government operations are adequate
- Recent bench testing has been completed by the NTIA Institute for Telecommunication Sciences to provide data needed to finalize conformance test procedures that will provide protection of government operations at 5 GHz

Cover story
July 23, 1990

Spectrum Relocation Fund Legislation

- President Bush signed the Commercial Spectrum Enhancement Act (CSEA) into law in December, 2004. It governs payment of costs incurred to federal agencies required to relocate from spectrum vacated for non-federal use and licensed by competitive bidding (auctions).

- Prior law may require winning bidders to negotiate with federal entities upon the close of an auction and to pay each agency directly for relocation costs. This led to uncertainty to both federal agencies and prospective commercial licensees regarding:
  - The final amount to be paid by each licensee,
  - Coordination of payments to incumbents among multiple auction winners, and
  - Whether the negotiation between the licensee and incumbent federal user would be successful. May require an arbitrator.

Spectrum Relocation Fund Legislation

- CSEA establishes a spectrum relocation fund from auction proceeds:
  - The funds are available to federal agencies required to locate from eligible frequencies.
  - Six months prior to an auction subject to CSEA, NTIA must submit, after OMB review, the affected federal agencies' estimated relocation costs and timeline for relocation to the FCC.
  - The law prohibits the FCC from concluding an auction unless total cash proceeds from any auction equals at least 110% of such estimated costs.
- On December 29, 2004, the FCC notified NTIA that the auction of the 1710-1755 MHz and 1432-1435 MHz bands will commence as early as June 2006.
- In early January 2005, NTIA notified the federal agencies of the new relocation procedures and expected auctions. NTIA has requested certain information from the agencies to meet the requirements of the CSEA.
- NTIA has held monthly meetings with agencies and requested that the agencies submit all information to NTIA by September 15, 2005.
- Based on inputs from 12 Federal agencies, NTIA has provided OMB cost estimates on October 13, 2005, including a schedule of relocation of spectrum.

Relocation Schedule

- **Dec 23, 2004** – CSEA signed
- **Dec 29, 2004** – FCC notified NTIA of auction for 1710-1755 MHz and 1432-1435 MHz bands as early as June 2006
- **Jan 6, 2005** – NTIA notifies affected agencies of auction, establishes working group, and requests agencies submit cost estimates by Sept 15, 2005
- **Feb 25, 2005** – Working Group/NTIA/OMB Meeting & NTIA letters to agencies on data required in estimate
- **Feb 25 – Sep 15, 2005** – Meetings as required
- **Sept 15, 2005** – Final cost estimates/timeline to NTIA
- **Oct 13, 2005** – Cost estimates/timeline to OMB
- **Dec 23, 2005** – NTIA reports (progress & policy options) to Congress
- **Dec 29, 2005** – Cost estimate/timeline to FCC & Congress
- **June 06, 2006** – Expected auction date
- **Start of 2007** – Expected auction receipts deposited in Treasury
- **2007 – 2012** – Agency relocation and requests for funds from OMB

President's Spectrum Policy Initiative

"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

Stated Purposes:

- To foster economic growth,
- Ensure national and homeland security,
- Maintain U.S. global leadership in communications technology development and services,
- Satisfy other vital U.S. needs such as public safety, scientific research, federal transportation infrastructure and law enforcement.

The Vision for Spectrum Policy Reform

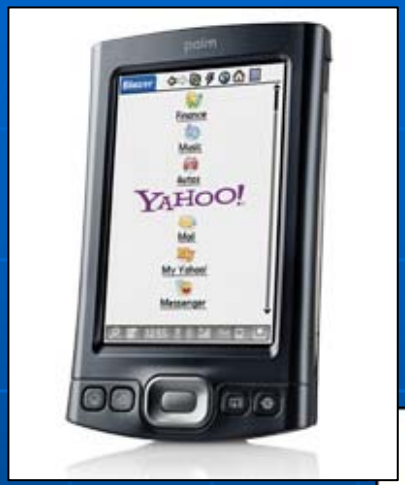
Support critical government functions:

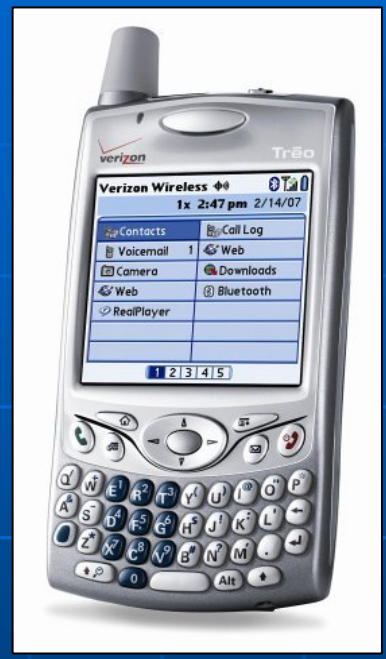
- Ensure that the spectrum needs of national defense, homeland security and public safety are met

Innovation:

- Support the timely deployment of new products and services
- Promote market driven competition to the extent feasible
- Create an environment fostering technological innovation and efficient use of spectrum
- Ensure U.S. global lead in spectrum-based technologies

The Vision for Spectrum Policy Reform





President's Spectrum Policy Initiative Milestones

President's Executive Memorandum to Federal Departments and Agencies (June 2003)

-- Stated Need and Objectives

Two Reports from Secretary of Commerce to the President (June 2004)

-- Recommendations of the Federal Government Spectrum Task Force

-- Recommendations from State and Local Governments and Private Sector Responders

Second Executive Memorandum (November 2004)

-- Adopted recommendations as policy

-- Assigned responsibilities and deadlines for implementation

Secretary of Commerce Implementation Plan

-- To implement those recommendations of the reports not expressly directed to other agencies and offices

UWB Signals Using Fixed Time-Base Dither

$$x(t) = \sum_{n=-\infty}^{\infty} \sum_{k=0}^{1} \alpha_{kn} p_k (t - nT - \Theta_n)$$

$$\alpha_{kn} = 1 - a_n, k = 0$$
$$\alpha_{kn} = a_n, k = 1$$

$$\alpha_n = 0, prob = g_0$$
$$\alpha_n = 1, prob = g_1 = 1 - g_0$$

President's Direction
2nd Executive Memorandum (Nov 04)

- **OMB**
  - Provide capital planning guidance to agencies
  - Implement methods for improving capital planning
- **Agencies**
  - Provide strategic plans to DOC
  - Implement formal evaluation process to obtain most spectrum efficient services
- **DHS**
  - Develop Spectrum Needs Plan (PS & COG)
  - Identify Public Safety spectrum needs
- **DOC**
  - Integrate agency strategic plans into Federal plan & assist in formulating National Plan
  - Develop plan for identifying/implementing incentives that promote efficient/effective use of spectrum
  - Establish a plan to implement all other recommendations
  - Provide a progress report annually

President's Spectrum Initiative
Implementation Plan Projects

- ***Project A / Domestic Policies:*** Improve Stakeholder Participation and Maintain High Qualifications of Spectrum Managers
- ***Project B / International Policies:*** Reduce International Barriers to United States Technologies and Services
- ***Project C / Information Technology:*** Modernize Federal Spectrum Management Processes with Advanced Information Technology
- ***Project D / Public Safety:*** Satisfy Public Safety Communications Needs and Ensure Interoperability
- ***Project E / Engineering Analysis and Technology Assessment:*** Enhance Spectrum Engineering and Analytical Tools
- ***Project F / System Review and Spectrum Authorization:*** Promote Efficient and Effective Use of Spectrum
- ***Project G / Spectrum Planning and Reform:*** Improve Planning and Increase Use of Market-based Economic Mechanisms in Spectrum Management

Commerce Spectrum Management Advisory Committee (CSMAC)

- Appointment of this advisory committee implements a recommendation adopted as policy by the Administration in the Nov. 2004 Executive Memorandum.
- Committee members will provide advice to the Assistant Secretary on needed reforms to domestic spectrum policy.
- It will consist of a cross-section of participants with expertise in spectrum management; including non-federal government users, technology developers, manufacturers and service providers.
- The deadline for submitting nominations is Nov. 28, 2005. For additional information on the President's Spectrum Policy Initiative and the advisory committee nomination process, visit www.ntia.doc.gov.

Next Steps

- Continue the implementation process of the 24 recommendations:
  - Plans and Policy Steering Group
  - Spectrum Management Advisory Committee
  - Interagency Working Level Groups (7)
- Submit the Annual Report to the President – November 30, 2005
- Obtain Agency Strategic Spectrum Plans to NTIA – November 30, 2005
- Complete the Federal Strategic Spectrum Plan – May 2006

Public Policy Focus: Public Safety

- NTIA's Public Safety Program supports:
  - Public Safety Practitioners
  - Dept. of Homeland Security's CIO's Office and Wireless Management Office
  - On behalf of the National Institute of Standards and Technology's Office of Law Enforcement Standards (OLES)
    - Dept of Homeland Security's SAFECOM Program
    - National Institute of Justice's CommTech Program (formerly known as the AGILE Program)
    - Dept of Justice's Community Oriented Policing Services (COPS) Program
    - Dept of Justice's Global Justice Information Sharing Initiative (Global)

NTIA Public Safety Program

Standardized interoperability work for wireless communications and information sharing --

Includes for the Long-Term Solution:

- Requirements Definition
- Architecture Framework Development
- Interface Specifications (Standards) Development
- Test and Evaluation
- R&D based on Gap Analysis (VoIP, security, MANET, etc.)

Includes for the Short-Term Solution:

- Assessment of Interim Interoperability Products

Net Value – and Net Threats – Continue to Grow

Then...	Now
Internet Users **16 million** (Verisign, 1995)	**Internet Users** **958 million** (InternetWorldStats, 9/05)
Domain Names **38.4 million** (Verisign, 2001)	**Domain Names** **83.9 million** (Verisign, 2Q05)
Average DNS Queries per Day - 3.3 billion (Verisign, 2001)	**Average DNS Queries per Day - 13.0 billion** (Verisign, 2005)
E-Commerce Revenue **$6.9 billion** (Census Bureau, 1Q01)	**E-Commerce Revenue** **$19.7 billion** (Census Bureau, 2Q05)
Average Emails per Day **15.8 billion** (IDC Market Analysis, 2001)	**Average Emails per Day** **31.8 billion** (IDC Market Analysis, 1Q05)
Virus encounters per 1000 PCs/month - 91 (Digital Economy Factbook, 2000)	**Virus encounters per 1000 PCs/month - 392** (Digital Economy Factbook, 2000)

U.S. Principles on the Internet's Domain Name and Addressing System

- The United States Government intends to preserve the security and stability of the Internet's Domain Name and Addressing System (DNS).
- Governments have legitimate interest in the management of their country code top level domains (ccTLD).
- ICANN is the appropriate technical manager of the Internet DNS.
- Dialogue related to Internet governance should continue in relevant multiple fora.

Conclusion

- Spectrum dependent services are essential to the United States' national security and economic security -- DoD has been a pivotal contributor to our world leading spectrum policy.
- IP services are having a very dramatic and positive impact on the U.S. economy.
- This Administration is committed to spectrum policies that create a domestic and international environment for economic growth by removing barriers to the implementation of U.S. technologies and services.
- Satisfy the United States' domestic requirements and provide worldwide spectrum policy leadership.