WCA International Symposium and Business Expo

"Wireless: Driving U.S. Innovation and Economic Growth"

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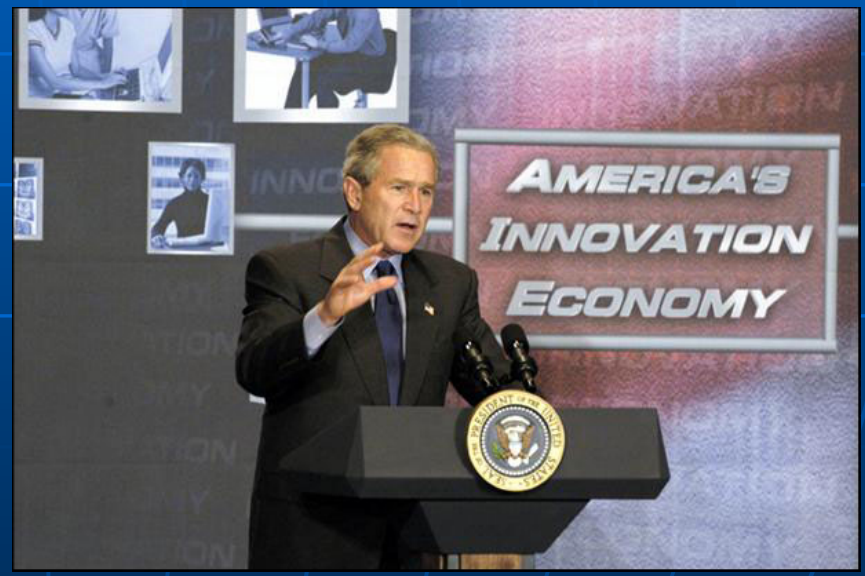
Overview

- State of the Economy
- The President's Broadband Vision
- Spectrum Policy
- Broadband Technologies
- Global View
- NTIA's Focus in 2006
- Conclusion



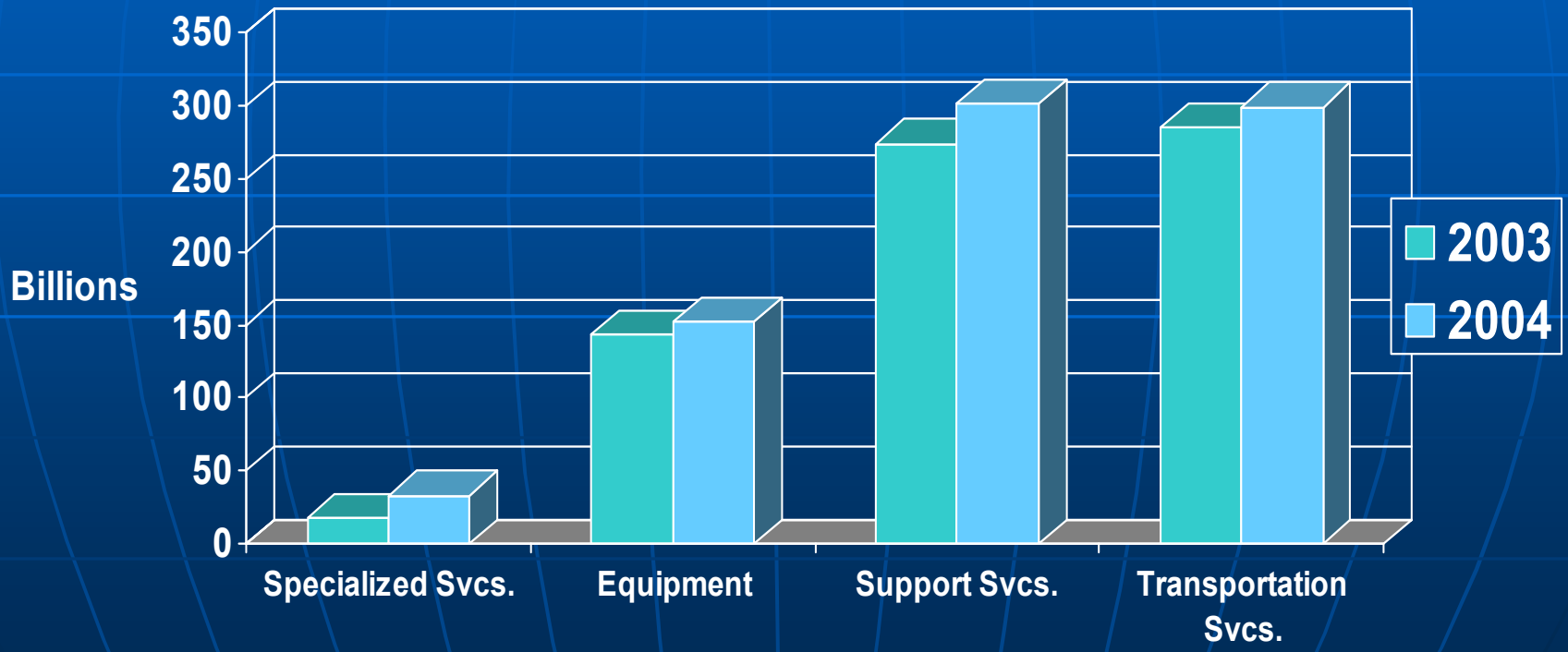
Overarching Goal:
Promoting Economic Growth

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

- GDP grew 4.3% in 3Q05 and 3.7% 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 economy has shown job growth for 30 straight months and added nearly 4.5 million new jobs since May 2003 – more than Canada, France, Germany, Great Britain, and Japan combined.
- Over the past four years, productivity grew at its fastest 4-year rate in over 50 years.
- 108,000 new jobs added in December – the U.S. unemployment rate is 4.9% (Dec. '05), while the EU25 unemployment rate is 8.3%.
- Manufacturing activity (ISM index) has been growing for 30 straight months – the longest period of growth in 16 years.
- National homeownership was 68.8% (3Q-05), near its record high of 69.2% in 4Q04.

U.S. Telecom Market Continues to Grow…

2004 Total: $784.5 billion (7.9% growth over 2003)
2003 Total: $720.5 billion (4.7% growth over 2002)



Source: *TIA's 2004 and 2005 Telecommunications Market Review and Forecast*

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 US 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 US 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 $299
  - RAM costs less than one-hundredth what it did in 1993

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."

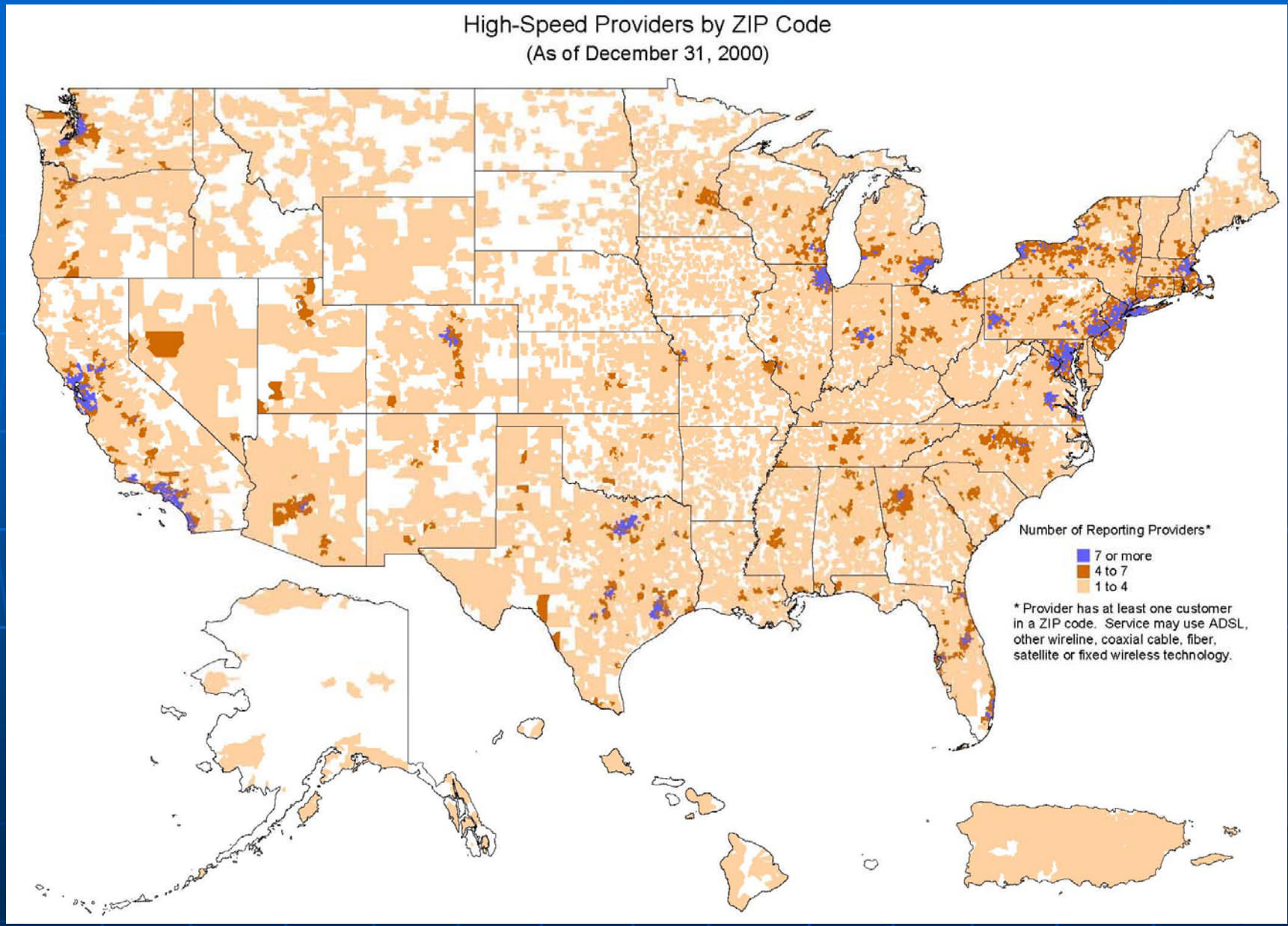
– President George W. Bush, Technology Agenda, November, 2002.

Benefits of Broadband

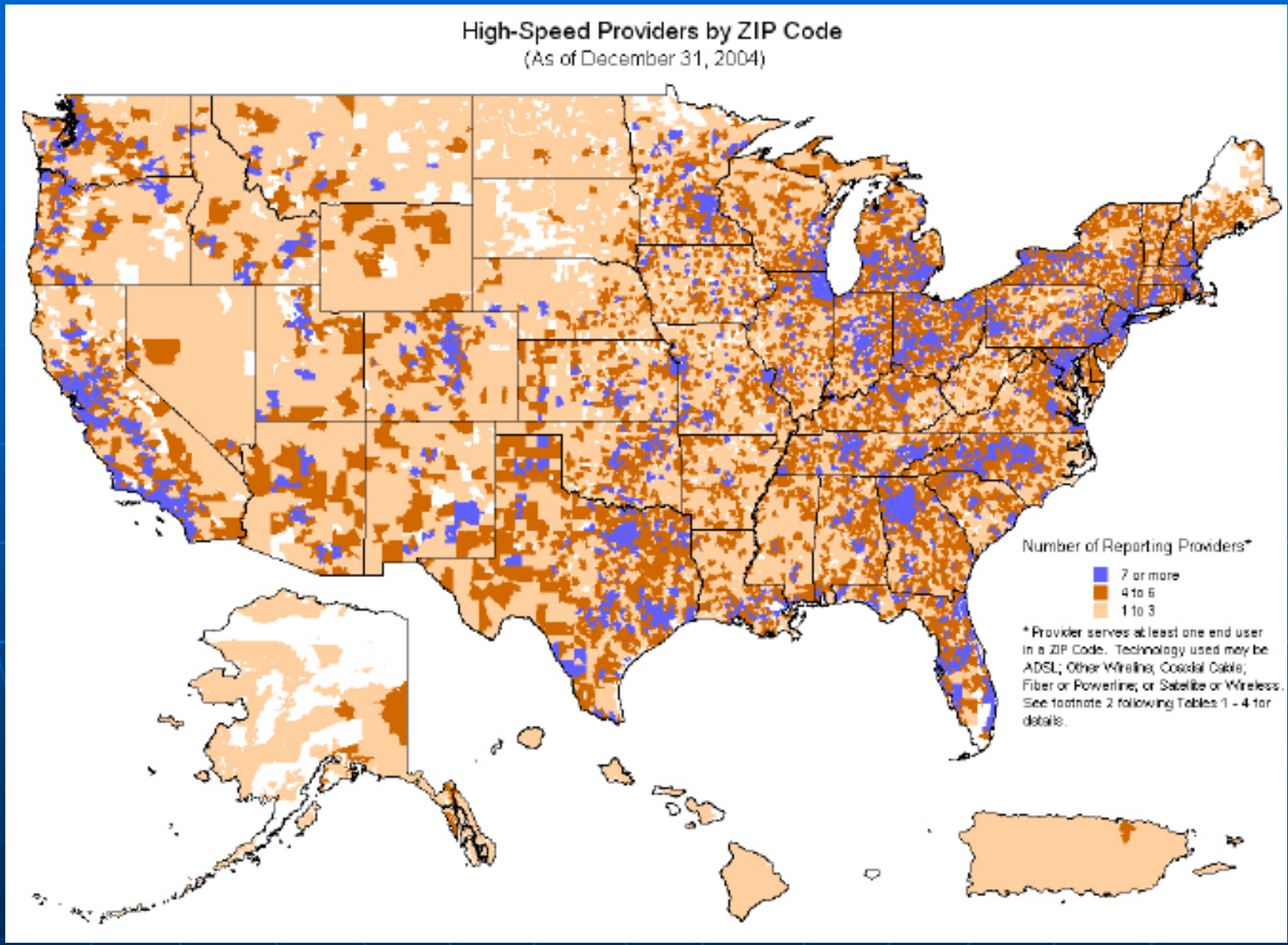
"[B]roadband will not only help industry, it'll help the quality of life of our citizens."

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

- Tele-Medicine
- Distance Learning
- Tele-Work
- National Security
- Jobs and Economic Growth


High-Speed Providers by ZIP Code
(As of December 31, 2000)
Number of Reporting Providers*
7 or more
4 to 7
1 to 4
* Provider has at least one customer in a ZIP code. Service may use ADSL, other wireline, coaxial cable, fiber, satellite or fixed wireless technology.

Source: FCC


High-Speed Providers by ZIP Code
(As of December 31, 2004)
Number of Reporting Providers*
7 or more
4 to 6
1 to 3
* Provider serves at least one end user in a ZIP Code. Technology used may be ADSL; Other Wireline; Coaxial Cable; Fiber or Powerline; or Satellite or Wireless. See footnote 2 following Tables 1 - 4 for details.

Source: FCC

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

President's Spectrum Initiative
Implementation Plan Projects

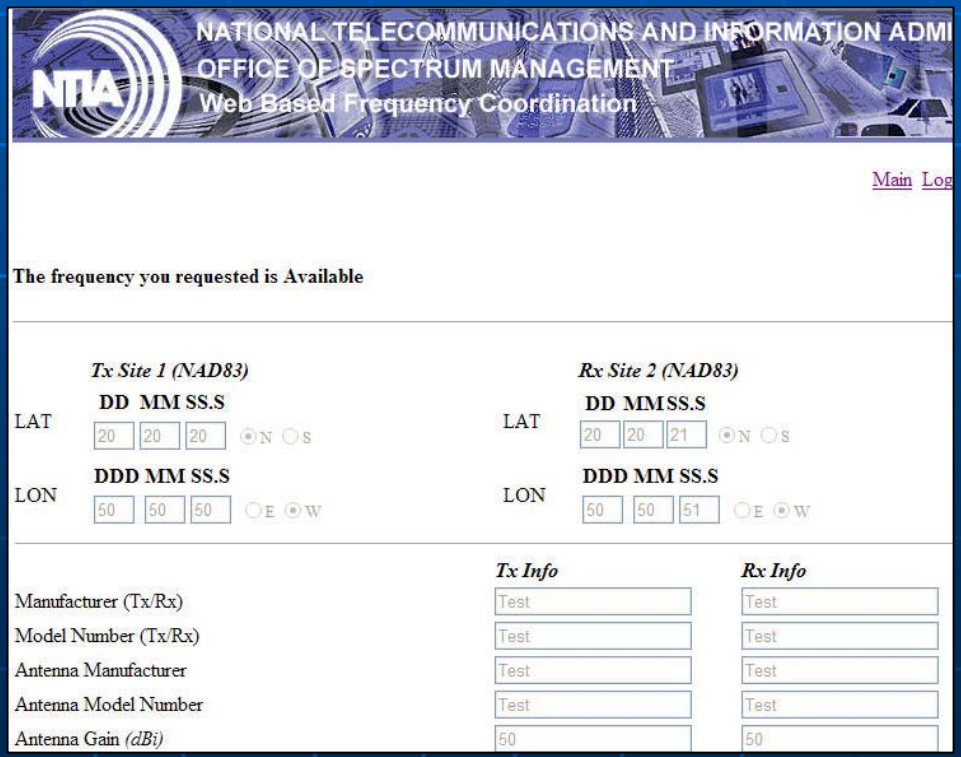
- ***Project A / Domestic Policies:*** Improve Stakeholder Participation and Maintain High Qualifications of Spectrum Managers
- ***Project B / International Policies:*** Reduce International Barriers to United States Technologies and Services
- ***Project C / Information Technology:*** Modernize Federal 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

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



Traditional Technology Options for Broadband Access

- **Broadband adoption will continue at a rapid rate** → By 2010, over 10% of U.S. households will likely subscribe to at least 24 Mb/s service, and by 2015 penetration should exceed 50%. Internet protocol video (IP video), especially high-definition (HD) IP video, are key drivers for higher data rates, according to a paper by Technology Future Inc. (YahooNews 12/19/05)
- **DSL**: DSL subscription prices continue to decline. Monthly subscriptions start for as little as $14.95, less than some dial-up subscriptions.
- **Cable:** With capital investment of $9.5 billion in 2004, the cable industry's investment since the passage of the Telecommunications Act of 1996 now totals approximately $95 billion. In terms of broadband access, the proportion of homes with such access has grown from 58% in 2000 to 93% in 2005. In 2005, cable broadband is available to 103 million homes, or 93% of US households passed by cable. (Source: NCTA)

Emerging Competitive Technology Options for Broadband Access

- **BPL:** Manassas , VA -- a suburb of Washington, DC – recently deployed the nation's first citywide broadband-over-power-line (BPL) system and is available to about 10,000 of the city's 12,500 homes. TXU and Current Communications recently announced plans for a 2 million home/business coverage area.
- **Fiber:** Between March 2005 and September 2005, over 1 million FTTH connections were added, according to researchers Render Vanderslice and Associates. This brings the total number of homes passed in North America to 2.6 million. More than 650 communities have FTTH connections. (10/4/05)
- **Satellite**: Satellites have long held potential for communications coverage of large, sparsely populated areas. Hughes-owned DirecWay counts 250,000 subscribers; Denver-based WildBlue launched a similar service in June 2005.

Wireless Applications Expanding Competition

- For the first time, U.S. businesses are expected to spend more on wireless services than wireline for 2006. Expenditures by enterprise firms (1,000 or more employees) on wireless data will grow an average of 18% per year through 2009. (Source: In-Stat)
- The wireless industry saw the largest one-year growth increase in subscribers in its history from June 2004 - June 2005 → Carriers added 25.2 million subscribers. Currently there are more that 194 million wireless subscribers in the U.S. = 65% penetration of total population. (Source: CTIA)
- **WiMAX:**
  - FCC and FEMA authorized deployment of a WiMAX network (15 mile range with 45 Mbps bandwidth – 30x faster than standard 1.5 Mbps DSL connections) to link hotspots in an effort to restore communications damaged by hurricane Katrina.
  - InStat/MDR estimates that a company could reach 97.2% of the US population with a $3.7 billion investment in WiMAX.
  - Industry analysts believe the WiMAX Market will be worth anywhere from $3 billion to $5 billion by 2009. (Source: www.intel.com)

Wireless Applications Expanding Competition (cont'd)

- **Wi-Fi:** Rural Oregon is home to the world's largest Wi-Fi hotspot → 700 miles^2. Airgo Networks announced plans to sell Wi-Fi chips with data rates up to 240 Mbps by 4th quarter 2005 – 4x the speed of current Wi-Fi chips at 54 Mpbs.
- **WISPs**: Wireless Internet service providers, approximately 3,000 in the U.S., traditionally provide broadband connectivity in areas not reached by cable or DSL. Now WISPs are expanding into urban areas.
- **HSDPA:** 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.

Opportunities in International Markets

"In the last ten years, 3 billion people have joined the world economy."
- Craig Barrett, CEO Intel Corporation

- **The U.S. continues to lead with 203.5 million Internet users (68.7% penetration) as of Nov. 2005, representing 21.1% of world users. (InternetWorldStats, 11/05)**
- **India**
  - 1.08 billion people = world's largest democracy; 200 million people = world's largest middle class
  - Broadband and Internet growth a priority -- Government of India has set a goal of computer access for 75 million people and Internet access for 45 million people by 2010. Currently, only 15 million people have access to a computer.
- **China**
  - World's largest landline and mobile telecom networks – As of June 2005, 363 million mobile phone subscribers, 337 million fixed-line telephone subscribers (28% of population), 31.7 million broadband subscribers (26% of population)
  - China's telecom equipment market, ($20 billion estimated worth) is among the world's largest. U.S. exports comprise only $630 million of that total, leaving ample room for expansion.
- **Russia**
  - $33 billion investment in telecom industry needed in next ten years.
  - Mobile penetration almost twice that of fixed-line telephony, and growing at 104% annually.

Moore's Law and Other Factors Lead to Increased Broadband Adoption

- **Diversity of devices and applications:** i.e., Palm Treo 700w smart phones with camera, video, MP3, Bluetooth, email and web-browsing at broadband-like speeds, Microsoft OS
- **Increased content availability:** i.e., ESPN, MTV, NBC, Yahoo! and Google
- **HDTV** sets with crisper pictures and clearer sound are estimated to be in 16 million (or 15%) of U.S. households, up from 7% a year ago, according to Leichtman Research. (USAToday.com 12/30/05). CEA estimates 25 million U.S. homes will have a high-def TV set by year's end.
- **Gaming:** X-Box 360 sales have soared beyond expectations, Philips Entertaible prototype at CES, Sony's hi-def Playstation 3 to be released later this year.
- By 2009, 1MB of flash memory will cost two-tenths of 1¢ compared to $0.052 today. A 250GB drive can be bought for $109.99, or four-hundredths of 1¢ per GB. (Red Herring, 12/19/05)

Emerging Technologies Will Facilitate Broadband Deployment

- UWB
- IPTV
- Unlicensed Mesh Networks
- Software Defined Radio
  - Cognitive radios
- Smart Antenna Systems
  - Highly directional antennas (fractal antennas)

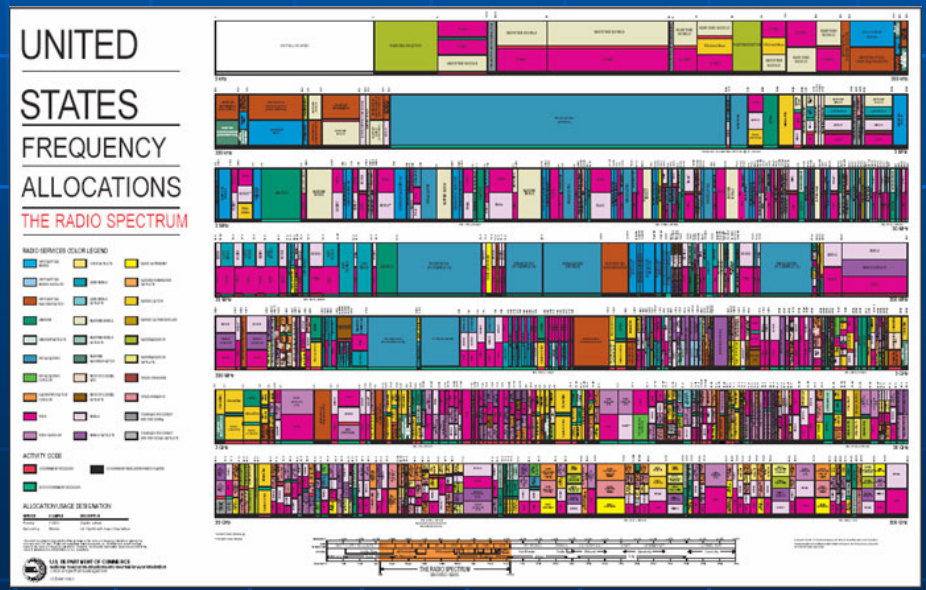
Palm's Treo 700w smartphone lets you surf the web at broadband-like speeds and runs on Microsoft OS

Intel WiMAX using
Intel® PRO/Wireless 5116

ZVUE Model 500 features a 3.5 inch-color LCD screen, 1GB of onboard flash memory, memory card slots and Wi-Fi, all for an estimated price of less than $300.

Next Steps for NTIA

- DTV – Feb. 17, 2009 hard date to return analog spectrum
- Commerce Spectrum Advisory Committee
- Deliverables for the President's Spectrum Policy Initiative
- 3G Spectrum auctions and timing
  - HSDPA/CDMA Rev. A
- Dynamic Frequency Spectrum sharing
- Internet Governance



Value – and Threats – Continue to Grow

Then...	Now
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)
Average Emails per Day **15.8 billion** (IDC Market Analysis, 2001)	**Average Emails per Day** **31.8 billion** (IDC Market Analysis, 1Q05)
Average Virus/Malware Incidents per Day **2.0** (Verisign, 2001)	**Average Virus/Malware Incidents per Day** **4.0** (Verisign, 2005)
E-Commerce Revenue **$6.9 billion** (Census Bureau, 1Q01)	**E-Commerce Revenue** **$20.8 billion** (Census Bureau, 3Q05)

Conclusion

- The President has a vision for making advanced technologies available to all Americans – by creating the economic and regulatory environment to enhance competition and promote innovation.

- The Bush 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.

- U.S. broadband adoption continues to be strong and the President's goal will ensure that all Americans have the personal and economic benefits of high-speed Internet applications and services.