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# Overview

- State of the Economy
- The President's Broadband Vision
- New and Emerging Broadband Technologies
- Spectrum Policy

# 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 2.8% in the second quarter of 2004; economic growth in second half of 2003 was the fastest in nearly 20 years.
- Over the last year, 1.7 million new jobs have been created, including 107,000 in the manufacturing sector since January.
- There has been a sharp pickup in business spending on capital equipment.
- Homeownership is presently at its highest level ever – 68.6 % 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 15<sup>th</sup> month in a row.

# Economic Growth in Georgia in Strong

- Georgia has a civilian labor force of 4.4 million workers. In the Corp. for Enterprise Development's most recent (2003) Development Report Card for States, Georgia was ranked 5<sup>th</sup> in long-term employment growth and eight in job growth due to new businesses. It was also ranked 7<sup>th</sup> in venture capital investments.
- Georgia now has an unemployment rate (4.1%) lower than the national average.
- International exports from Georgia in 2003 increased 13% and totaled \$16.3 billion. Georgia ranked 14<sup>th</sup> among the 50 states in 2003 in terms of export value.
- A total of 10,004 companies exported from Georgia locations in 2001. Of those, 8,383 (84%) were small and medium-sized enterprises with fewer than 500 employees.

- Source, Office of Trade and Economic Analysis, International Trade Administration, US Department of Commerce, 8/26/04

# 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.

# 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

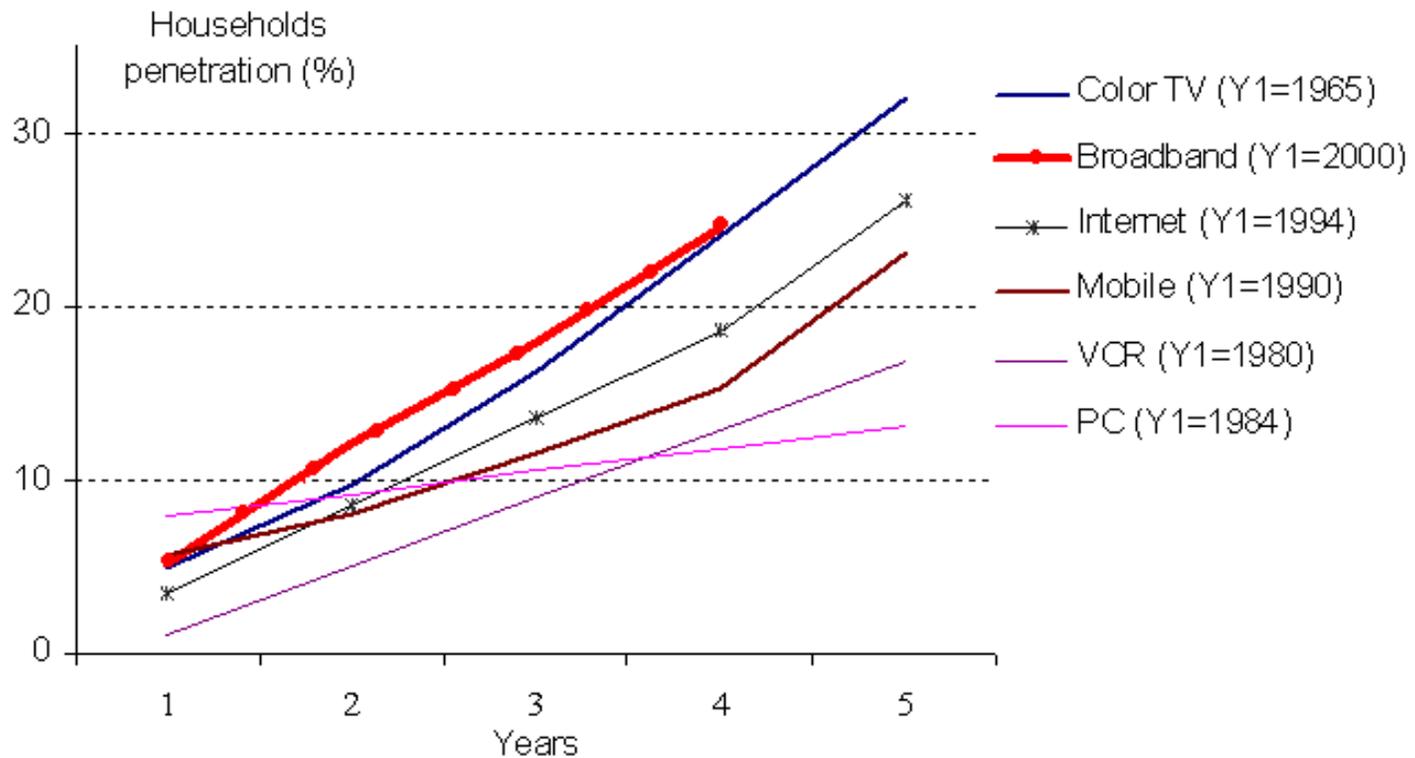
- A Federal Rights-of-Way Working Group set out recommendations to improve access to rights-of-way management across federal lands to promote the deployment of broadband. The called for improvements in: (1) Information Access and Collection, (2) Timely Processing, (3) Fees and Other Charges, and (4)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

## Reducing Legacy Regulation of Broadband Services:

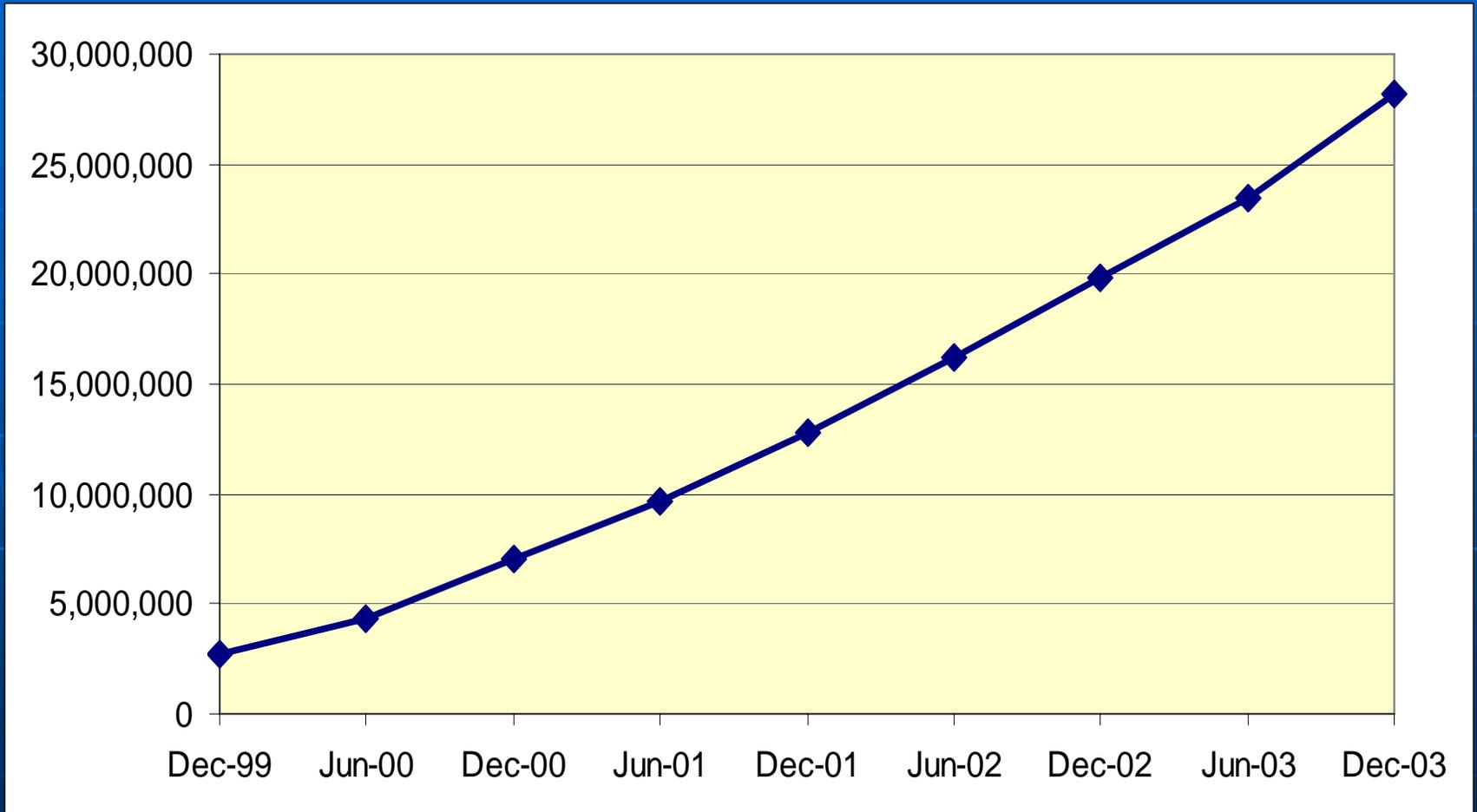
- The Administration supports the FCC’s order freeing newly deployed broadband infrastructure from legacy regulation

# Rate of Broadband's Diffusion in the U.S. is Strong

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



# Total High Speed Lines in the U.S.

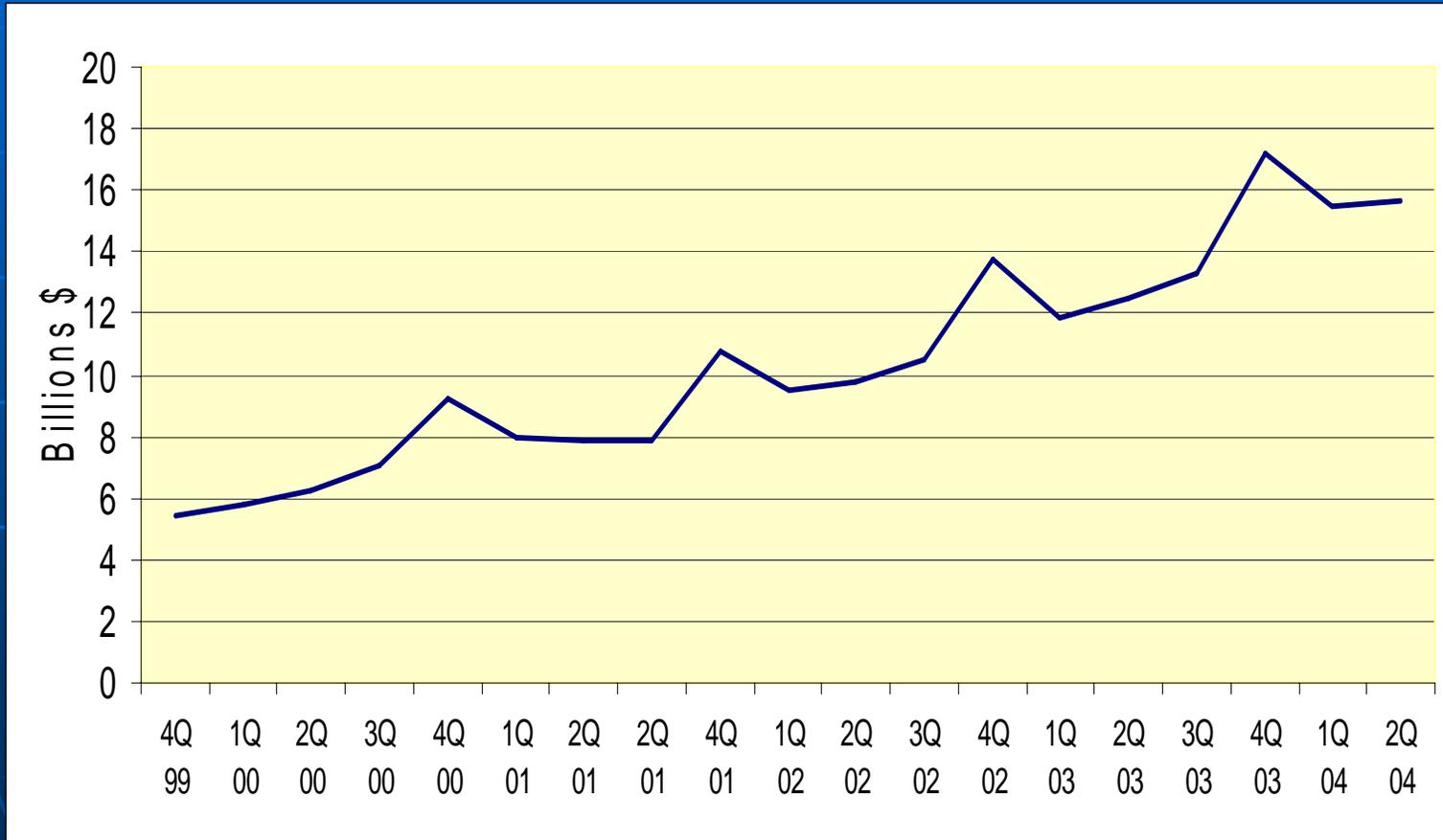


Source: FCC, 2004

# The Growth of E-Commerce in the U.S.

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

4<sup>th</sup> Quarter 1999 – 2<sup>nd</sup> Quarter 2004



Source: U.S. Census Bureau, 2004

# 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.

# 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
- Some Communities developing major free hot spots:
  - Long Beach, CA
  - San Jose, CA
  - Washington, DC
  - Las Vegas, NV
  - New York, NY
  - Austin, TX

# 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.

# 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.
- Freescale Semiconductor (Motorola Inc.) has detailed the current and next generation UWB product family roadmap at the Wireless Connectivity (WiCon) World Expo in Amsterdam on June 7, 2004. Over the next year, Freescale plans to deliver three advanced UWB product families, including the industry's first 1 Gbps UWB solution.
- The WiMedia Alliance has announced its endorsement of the MBOA UWB standards for use with the WiMedia Convergence Platform.
- 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.

# 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

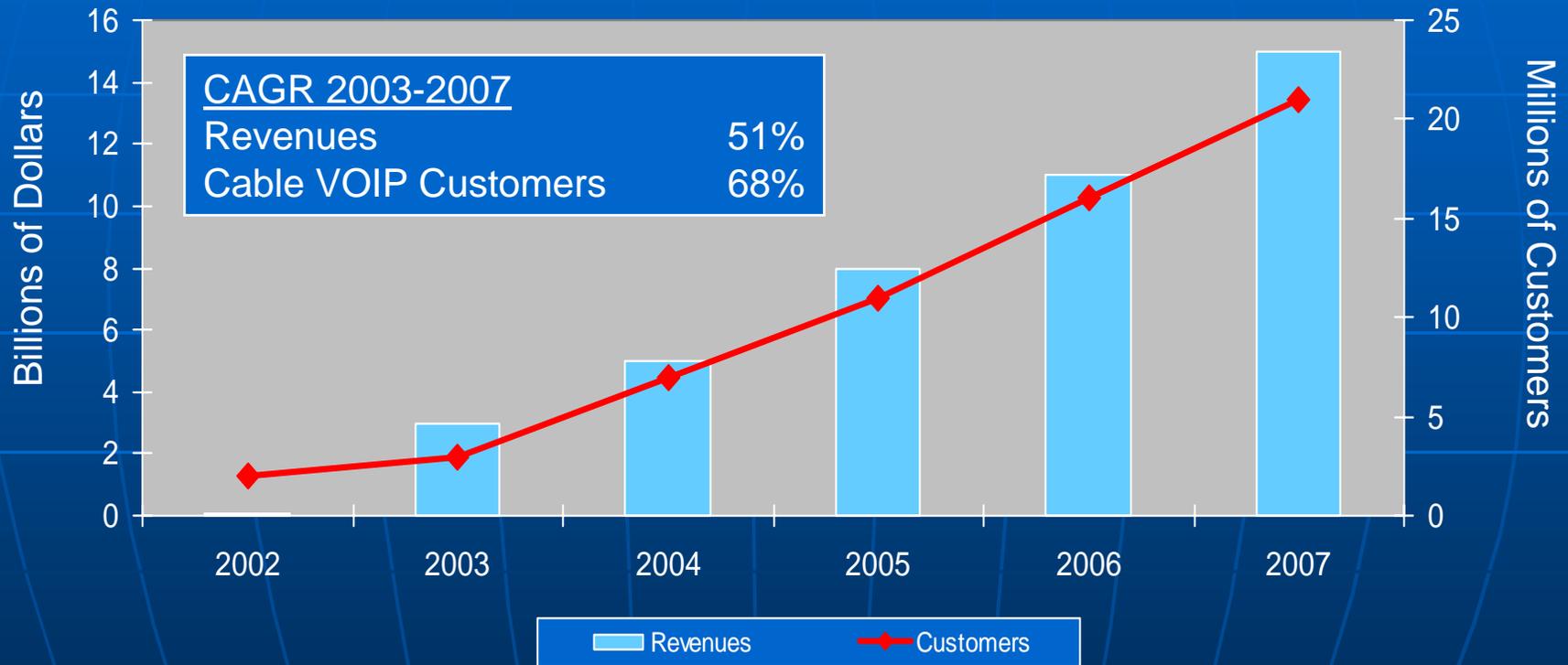
- Principal concern is the risk that BPL systems might interfere with federal government radio communications or other state and private radio operators.
- FCC began BPL rulemaking on February 12, 2004.
- On April 27, 2004, NTIA submitted to the FCC a Phase 1 interference report, which suggested interference 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

# President's Spectrum Policy Initiative

- In the Presidential Memorandum signed on May 29, 2003, President George W. Bush:
  - First stated that “the existing legal and policy framework for spectrum management has not kept pace with the dramatic changes in technology and spectrum use”; and
  - Then committed the Administration to promoting the development and implementation of a comprehensive United States spectrum policy for the 21<sup>st</sup> century.
- The objectives of this initiative are:
  - 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 Secretary of Commerce was tasked to implement this initiative

# Spectrum Policy for the 21<sup>st</sup> Century

- On June 24, 2004, the Department of Commerce released two spectrum reports with recommendations to develop a U.S. spectrum policy for the 21<sup>st</sup> 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

# Mobile Advanced Wireless Service Policies

- Chief aim of federal policies for mobile services is to ensure sufficient spectrum and competition so that the market works to fulfill availability, price and service quality objectives of consumers
- An increasing amount of spectrum is being made available for mobile advanced wireless services – most recently 2495-2690 MHz, and new licenses around 1900 MHz
- New spectrum will allow services to grow into high data rate applications
- Provide incentives in spectrum auctions to expand the number market players and in selected cases to promote service availability
- Provide for secondary markets for mobile networks to improve efficiency and fill-in or extend coverage of wireless networks

# Software Defined Radio (SDR)

- SDR can potentially solve problems facing the commercial wireless communication industry by easing the transition to new technologies
- Example – SDR-enabled devices can be dynamically programmed in software to reconfigure the device's characteristics for better performance, richer feature sets, advanced new services that provide choices to the end users and new revenue streams for the service provider
- SDR has the potential to alleviate interoperability problems facing federal, state, and local public safety organizations, and spectrum access and deployment problems faced by the military
- Current projects involved in the development of SDR include Department of Defense's Joint Tactical Radio System (JTRS)
- Security issues need to be resolved before SDR technology can be fully accepted for commercial and public safety applications

# Cognitive Radio

- Cognitive radio technology is a particular extension of SDR that employs model based reasoning based upon its assessment of the radio environment.
- NTIA is addressing the following issues raised in the FCC's Notice of Proposed Rulemaking on SDR and CR:
  - Ways CR can facilitate opportunistic use of the spectrum by unlicensed devices while protecting incumbent licensed spectrum users;
  - Rules for CRs permitting additional flexibility for unlicensed devices operating in rural and underserved areas;
  - How CR can enhance interoperability between different public safety entities;
  - Changes to the FCC's equipment authorization processes to better accommodate SDR and CR systems.

# Smart Antenna Technology

- Smart antenna systems provide numerous benefits in wireless communications environments:
  - Reduce multipath fading
  - Increase system capacity
  - Extending battery life of terminals
  - Extending the range of base stations
  - Interference reduction
- Systems employing advanced antenna designs such as sectorized and phased array adaptive antennas are now being used as part of wide area network systems.
- Sectorized and phased array antennas are used to create dynamic communication links with associated mobile and fixed devices in any direction around an antenna structure.
- The FCC has issued a rulemaking (et docket no. 03-201) to address compliance measurement issues related to sectorized and phased array antenna systems.

# Technology is Also Transforming Media Businesses

## ■ The advent of DVDs

- In 1997, DVD players retailed for \$500 to \$800, and 315,136 units sold that year
- Last year, almost 22 million DVD players sold at prices as low as \$30
- In 2003, Americans spent \$22.5 billion on home video entertainment compared to \$9.2 billion at the box office. DVD sales boosted home video sales by 37% last year, and represented a \$4.3 billion annual increase over 2002
- DVD sales and rentals accounted for 40% of movie studio revenues in 2003, compared to less than 1% in 1997
- Warner Home Video launched the format with less than 100 titles. Now every major studio relies on sales and rentals of the more than 40,000 DVD titles currently available

# Moore's Law and IT Hardware Sales Suggest a Changing World

- Worldwide sales of semiconductors jumped 36.9% to \$17.3 billion in May 2004 to their highest level since December 2000
- Intel, the world's largest semiconductor maker, said that it expected revenue of \$8 billion to \$8.2 billion in the quarter ending June 26, 2004, with a gross profit margin of 60 percent to 61 percent, about the same as in the first quarter and roughly 10 points higher than a year earlier
- Moore's Law = declining memory costs: Computer memory prices on the spot market have fallen about 24% since early April 2004 to about \$4.80 at the end of May from an early-April peak of \$6.30 for 256 megabits of DDR SDRAM (double data rate synchronous dynamic random access memory).
- Cisco had \$4.9 billion in net product sales related to routers in fiscal 2003
- Life on the "Edge" is good!
  - Much Less Expensive PCs
  - Digital Cameras
  - MP3 Players
  - PVRs
  - Plasma/LCD/DLP
  - XM/Sirius Satellite Radio
  - Digital Radio
  - USB/Livewire/Bluetooth