Effects of Broadband Policy and Economic Stimulus on Innovation at the Edge and in the Cloud

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Agenda

- Federal Policy Objective Overview
- Key Federal Actors
- Outlook
  - Broadband Deployment
  - Treatment of Broadband Networks
  - Network Neutrality
  - Wireless Networks / Spectrum Policy
  - Universal Service
  - Intercarrier Compensation Issues
  - Government Role in Innovation and Investment
  - Consumer Rights / Disability
  - Next Generation 911 Networks / Cyber security
- Conclusion

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Federal Policy Objectives

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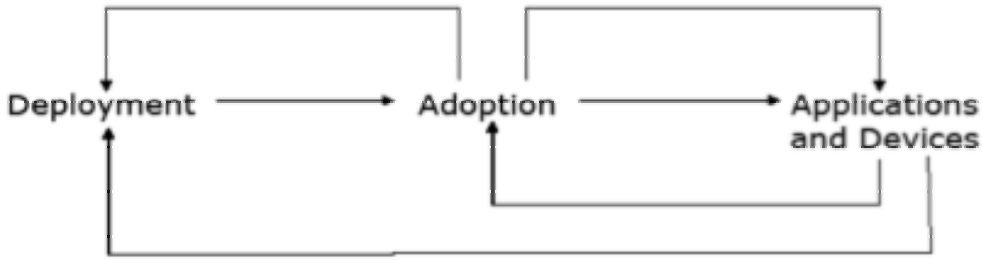
Federal Policy Objectives

Broadband as foundation for sustained economic success:
Accelerating the dynamic of the broadband ecosystem



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Federal Policy Objectives

- Congress directed the FCC to produce a National Broadband Plan by January 2010.
  - March 16th Extension
  - The Plan must seek “to ensure that all people of the United States have access to broadband capability” and establish benchmarks to meet that goal.
  - The Plan will presumably build upon the FCC’s Rural Broadband Plan released in May 2009 pursuant to the 2008 Farm Bill.

Federal Policy Objectives

- Edge/Cloud
  - Open Internet
  - Other Regulatory Policies
- Adoption
  - Education and Training
  - Promote use of Broadband in Key National Purposes
- Networks
  - Broadband Stimulus
  - Broadband Policy and Regulatory Framework
  - Spectrum Policy

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Federal Policy Objectives

- Achievement of Objectives Will likely Require
  - Agency and Administrative Action
    - FCC, NTIA, RUS
  - Legislative Action
  - Federal Technical and Procurement Changes
    - Lead by Example; Government Can Drive Adoption, Innovation and Demand
  - Competition Policy
    - FTC, DOJ

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Key Players

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Key Players - 111th Congress

- Major telecom legislation unlikely during this Congress
  - Committees with jurisdiction over telecom also have to deal with financial services, energy, health care
  - Focus of Democratic majority has been on consumer issues, FCC oversight
- Single issue/consumer protection bills may make progress
  - Make FCC more open, transparent
  - Wireless billing, contracts, handset exclusivity, cable program access are all potential targets
  - Spectrum Policy

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111th Congress

- **Senate**:
  - Jay Rockefeller (D-WV), Chairman of Commerce Committee.
    - Favors universal broadband deployment; consumer protection in wireless; likely tougher on FCC than Inouye
  - Kay Bailey Hutchinson (R-TX), Ranking Member of Commerce Committee
    - Will resign later this year to run for Governor of Texas in 2010
    - Olympia Snow (R-ME) likely to replace
  - Sen. John Kerry (D-MA), Chairman of Telecommunications Subcommittee
  - Sen. Patrick Leahy (D-VT), Chairman of the Judiciary Committee
  - Sen. Jeff Sessions (R-AL), Ranking Member of Judiciary Committee
  - Sen. Herb Kohl (D-WI), Chairman of the Antitrust Subcommittee

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111th Congress

- **House**:
  - Rep. Henry Waxman (D-CA), Chairman of the Commerce Committee
  - Rep. Joe Barton (R-TX), Ranking Member of the Commerce Committee
  - Rep. Rick Boucher (D-VA), Chairman of the Telecommunications Subcommittee
  - Rep. Cliff Stearns (R-FL), Ranking Member of the Telecommunications Subcommittee
  - Rep. John Conyers (D-MI), Chairman of the Judiciary Committee
  - Rep. Lamar Smith (R-TX), Ranking Member of the Judiciary Committee

Key Players - FCC

- Julius Genachowski (D), Chair, 6/30/2013
  - Chairman appoints Bureau Chiefs; possibly reorganizes Bureaus
    - Former advisor to Chairmen Hundt and Kennard
    - Friend of Obama since law school and major fundraiser
    - Formerly managing Director at Rock Creek Ventures
- Michael Copps (D), 6/30/2010
- Robert McDowell (R), 6/30/2014
- Mignon Clyburn (D), 6/30/2012, confirmed 7/24
  - Former SC PSC commissioner
- Meredith Baker (R), 6/30/2011, confirmed 7/24
  - Acting NTIA Administrator under Bush

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Key Players - Other Agencies

- Other Key Agencies:
  - Jonathan Adelstein, administrator of RUS (former FCC Comm'r)
  - Larry Strickling, Administrator of NTIA
  - Christine Varney, Ass't Atty. General - Antitrust

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Outlook

Broadband Deployment

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Broadband Stimulus Package

- The American Recovery and Investment Act of 2009 (ARRA) dedicates $7 billion in “stimulus” funds to the expansion of broadband facilities and services to “unserved,” “underserved” and rural areas
  - Goal: increase broadband supply
  - Distributed through Commerce Department NTIA and Agriculture Dept RUS program
  - Grants carry net neutrality obligations
- Other ARRA programs (health care, smart grid, transportation, etc.) may stimulate broadband demand

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Recovery Act Broadband Stimulus

- $787 billion in Act
- $7.2 billion for broadband
  - $2.5 billion for RUS BIP
  - $4.7 billion for NTIA BTOP
  - $350 million for broadband inventory map
  - $250 million for programs to encourage adoption of broadband services
  - $200 million for expanding computer center capacity

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First Notice of Funds Availability (NOFA) to release $4 billion

- $2.5 billion for RUS BIP
- $1.6 billion for NTIA BTOP

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First Round Funding Application

- Almost 2,200 applications
- $28 billion requested ($4 billion available)
- $23 billion for broadband infrastructure
  - 260 apps, $5.4 billion requested from NTIA
  - 400 apps, $5 billion requested from RUS
  - 830 apps, $12 billion joint requests
- $10.5 billion in matching funds pledged
- Over $38 billion in proposed infrastructure projects
- Second/Third Round

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Health Information Technology

- Legislation enacted February 17th
- Amends Public Health Service Act with new Health Information Technology for Economic and Clinical Health (HITECH) Act
- Purpose to develop nationwide health information technology infrastructure that allows for the electronic use and exchange of information

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Health Information Technology

- Over $19 billion total investment in Health Information Technology (HIT)
- • Over $16 billion -- medical provider incentives through Medicare/Medicaid to obtain, utilize HIT (and eventual penalties)
  - • Over $3.5 billion -- Health Information Technology (HIT) grants and loans. Office of National Coordinator for Health Information Technology
  - Health Resources and Services Administration
  - Indian Health Service
  - Social Security Administration

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FCC Broadband Plan

- Congress directed the FCC to produce a National Broadband Plan by February 2010.
  - The Plan must seek “to ensure that all people of the United States have access to broadband capability” and establish benchmarks to meet that goal.
  - The Plan will presumably build upon the FCC’s Rural Broadband Plan released in May 2009 pursuant to the 2008 Farm Bill.
  - Currently the FCC’s top internal priority

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Broadband Notice of Inquiry

- The FCC released a Notice of Inquiry in April 2009.
  - The NOI asks for comments on how to define broadband, what kind of access is meaningful, and how to measure progress.
  - The NOI also asks what market mechanisms and regulatory reforms should be considered to promote the goals.
  - In addition to policy arguments, the FCC was clearly interested in collecting market and competitive statistics and other quantitative data to support any findings.

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FCC Broadband Workshops

- The FCC will used these workshops to develop the record that it perceives as lacking in the comments

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The current landscape

- Great News: U.S. leads in many areas
  - Chipsets; software; applications and Internet services; Internetworking equipment

- Not So Great News:
  - At most 2 providers of fixed broadband services will pass most homes
  - 50-80% of homes may get speeds they need from only one provider
  - Deployment costs for various geographies are significantly different
  - Broadband adoption is lagging in certain customer segments
  - Industry consensus that more spectrum is needed to meet future requirements

A few highlights of what is coming

Applications

1. Wide variation in requirements from current applications, e.g., ~200 kbps to ~10 Mbps
2. Actual maximum download speed about half of advertised at peak hour for median user

Deployment

1. ~5M homes get less than 786 kbps advertised; universalization cost: ~$20Bn
2. ~35M homes get less than 10 Mbps; universalization cost: ~$50Bn
3. One platform capable to meet certain demand scenarios for 50% to 80% of homes
4. Capex and opex drive universalization costs: opex driven by wholesale transport
5. Increasing problems with USF, need reform to fund future network

Adoption

1. Several segments show penetration rates materially below the 63% average
2. Growing social cost: access to jobs, education, government services, information
3. First market research effort focused on non-adopters to design segmented approach

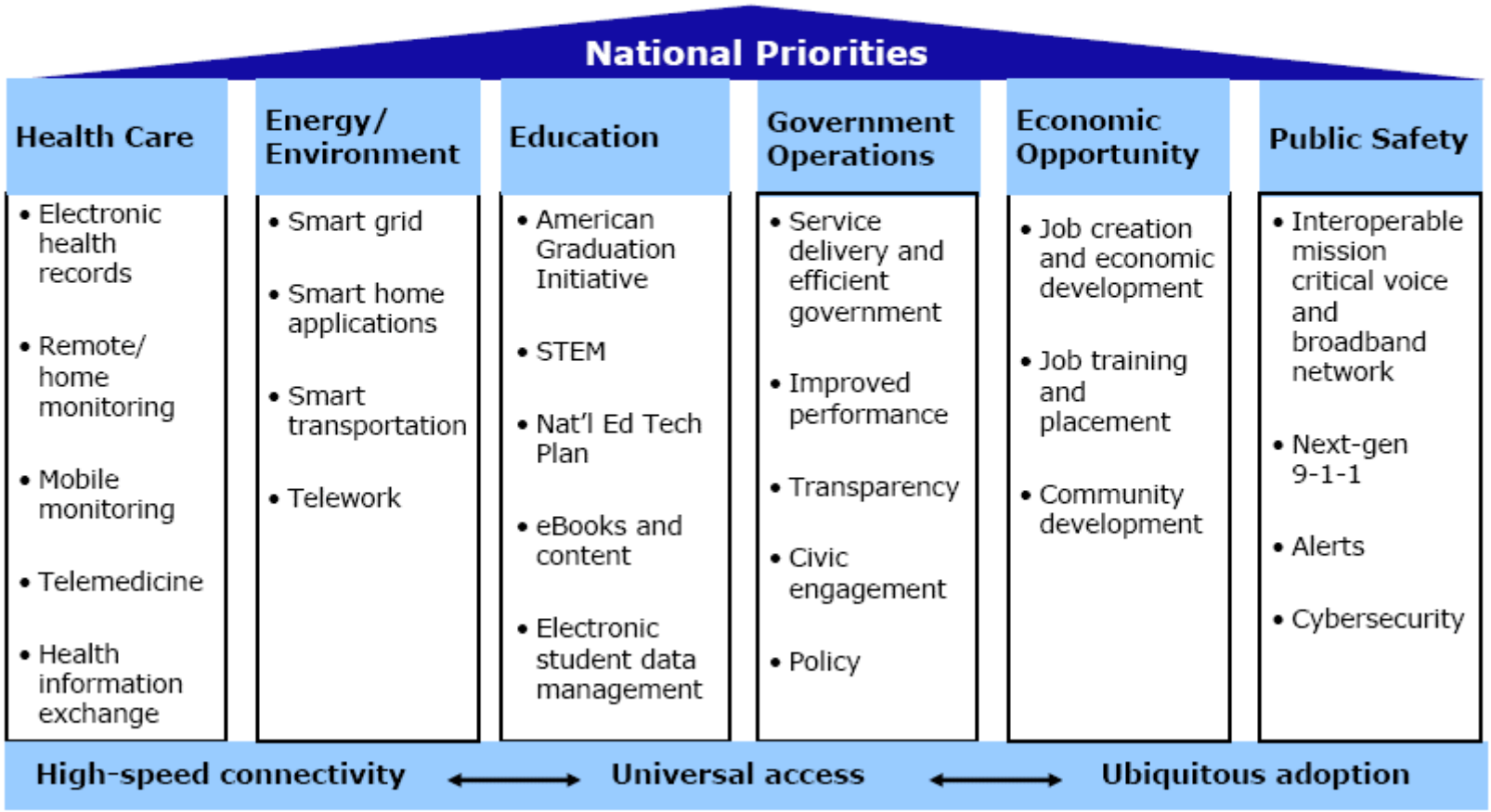
National Purposes

1. Value-creation requires apps, devices, connectivity, processes, and training
2. Health: Broadband enables hosted EHR: 18% savings and higher adoption by doctors
3. Energy: standards and home networking will drive innovation in demand management

Today's broadband in America: Workshops told a good news/bad news story

	Good News	Bad News
Education	• 71% of teens say Internet has been primary source for recent school project	• Students not online at growing disadvantage
Jobs	• Most job searches online • Application process increasingly online • Online training improving efficiency	• Those offline find it increasingly harder to search, train, and apply for jobs
Small Business	• Broadband enables faster acceleration, small business to function like large enterprises	• Many small businesses don't have connectivity sufficient for new opportunities, like cloud computing
Health Care	• 61% of Americans search for health information online	• Finding medical information without online access limits patients' knowledge, choices and care
Economic Development	• Many examples of communities using connectivity to lure new business investment	• Current broadband access in many places insufficient to attract new investment
Consumer Welfare	• Broadband-enabling consumer savings and improved product information	• Offline consumers face knowledge and cost gap

Broadband enables innovations necessary for the transformation



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Outlook

Key Telecommunications Policy Proceedings

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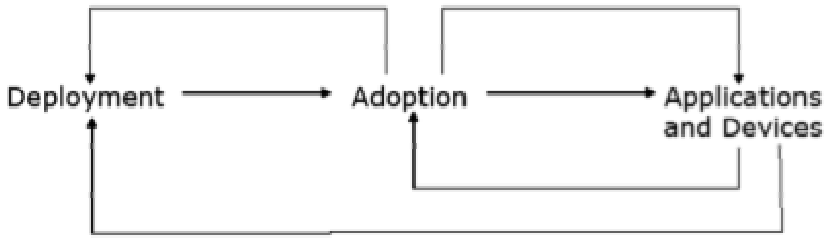
Communications Policy Objectives

Broadband as foundation for sustained economic success:
Accelerating the dynamic of the broadband ecosystem



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Major Communications Issues

- Major issues:
  - Regulation of Broadband Networks
  - Network Neutrality
  - Wireless Networks / Spectrum Policy
  - Universal Service reform
  - Intercarrier Compensation Issues
  - Government Role in Innovation and Investment
  - Consumer Rights / Disability
  - Next Generation 911 Networks

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Regulation of Broadband

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Broadband (de)(re)Regulation

- Telecommunications Act
  - Title II “Common Carrier Services”
    - 201/202
  - Brand X
    - In 2002, FCC ruled that cable modem Internet access is an “information service” not subject to common carriage rules under the Telecom Act; this frees cable companies from many fees paid by telco DSL services, and from mandatory access for 3d-party ISPs.
  - Title I “Ancillary Jurisdiction” -

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Impact of Broadband Deregulation

- What authority (if any) does it have to govern the conduct of broadband network providers?
- Does the FCC have Title I authority to regulate broadband providers?
- If so, can it similarly govern the conduct of Internet applications?
- Does it matter if something is Title II or Title I?

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Examples:

- Carterphone
- Madison River blocking Vonage (pre Brand X)
- AT&T (formerly) blocking VoIP on iPhone
- Exclusive Handset Arrangements
- Google Voice Application restricted from iPhone
- Future Concerns.....

Broadband Classification Questions

- What is “telecommunications” and subject to Title II regulation
- What is an information service and not subject to II
- What (if anything) can the FCC do under Title I

- Impact on VoiP, Video over Broadband, Web based Services

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Network Neutrality

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Rulemaking -- Net Neutrality

- 2005 Policy Statement
- Chairman announced intention to adopt Internet neutrality principles as Commission rules
  - Network operators cannot prevent users from accessing lawful content, applications, and services of their choice
  - Cannot prohibit users from attaching non-harmful devices to network
  - Competition among network, application, service and content providers
- Wants to add two more
  - Non-discrimination of content or applications
  - Transparency of network management practices

Network Neutrality

- Comments will be due on January 14, 2010, and reply comments will be due on March 5, 2010.
- Comcast (bit torrent case) January 10th

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Key Rulemaking Issues

- Should neutrality principles apply across all platforms (wireline, wireless, satellite)
- What is “reasonable network management”
- How should private networks be treated
- Are managed network services to be treated differently
- How will case-by-case approach work?

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Wireless & Spectrum Policy

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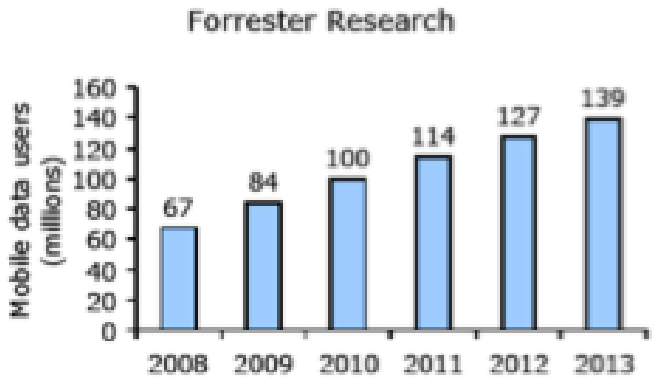
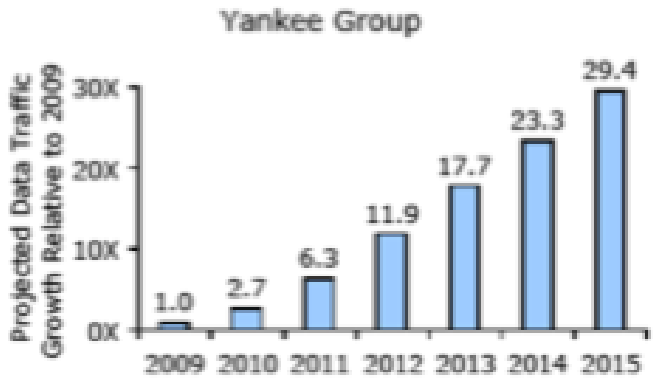
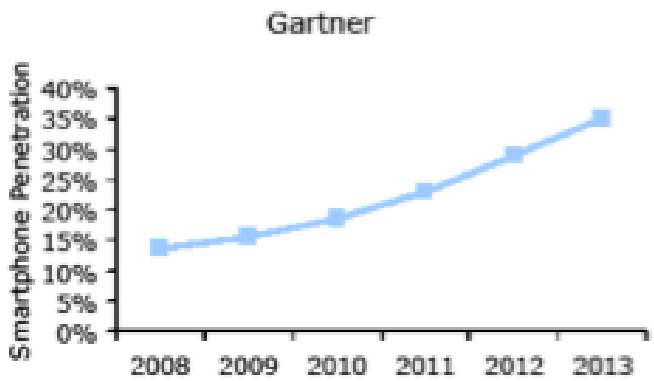
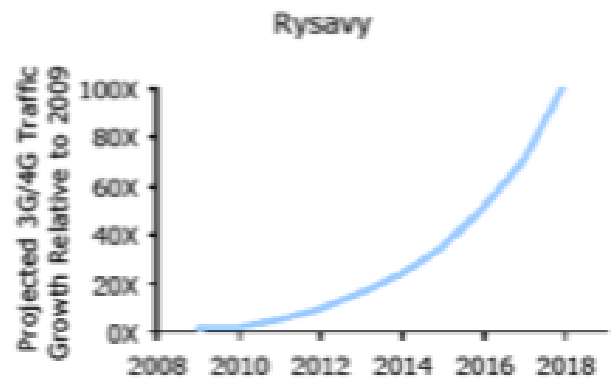
Analysts project rapid growth in mobile broadband

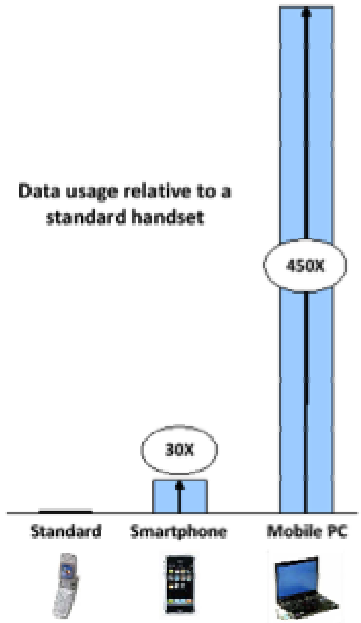








Smartphones and Mobile PCs are driving traffic growth



Source: Cisco

"Mobile broadband handsets (speeds of 3.5G and higher) and portables will account for **83%** of all mobile data traffic by 2013."
Cisco, 2009

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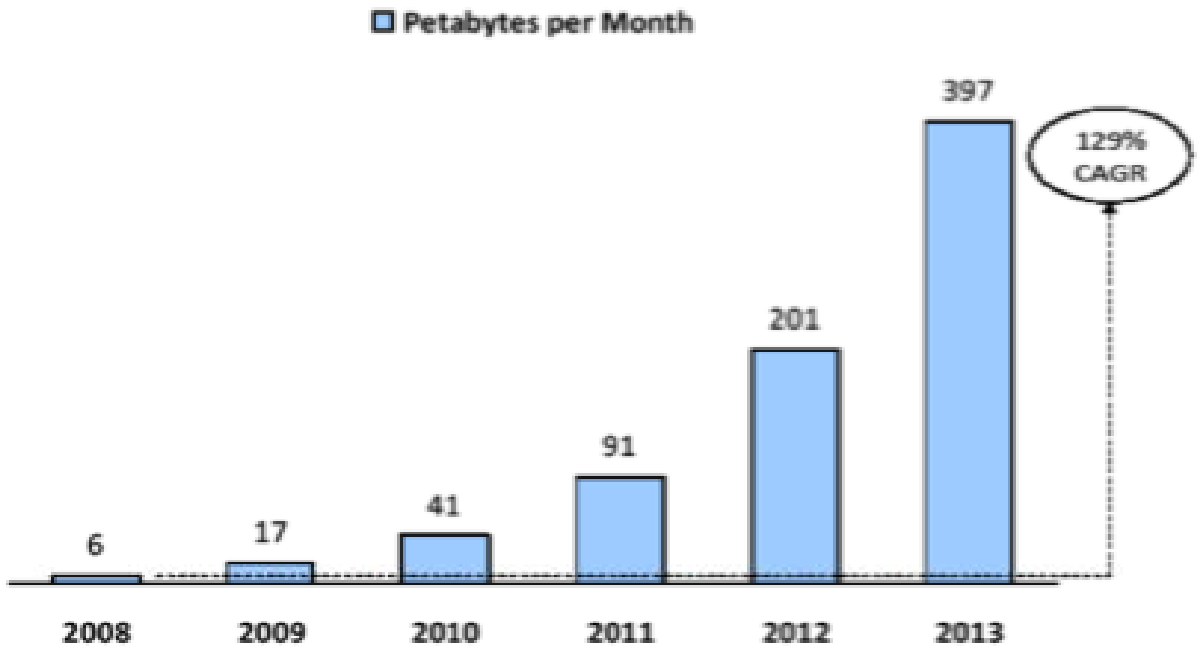
Mobile data usage is exploding



Source: Cisco VNI, 2009

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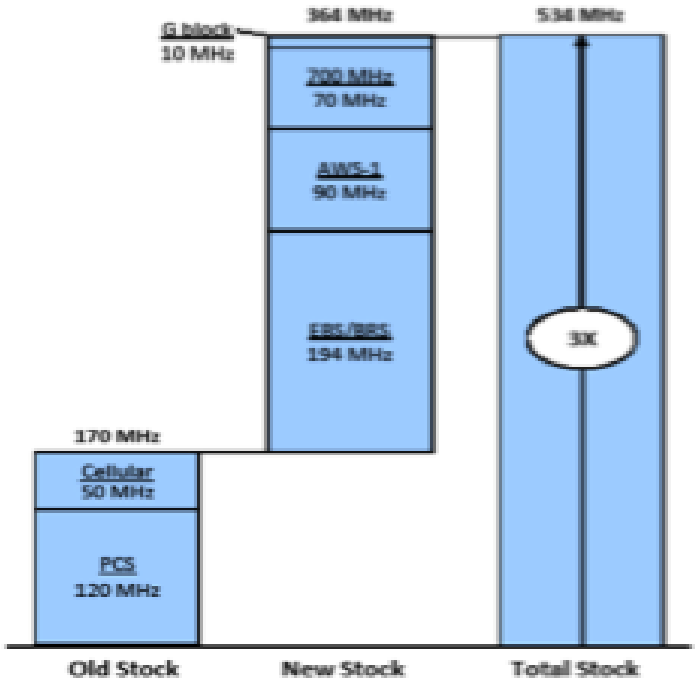
Spectrum available for mobile broadband has tripled



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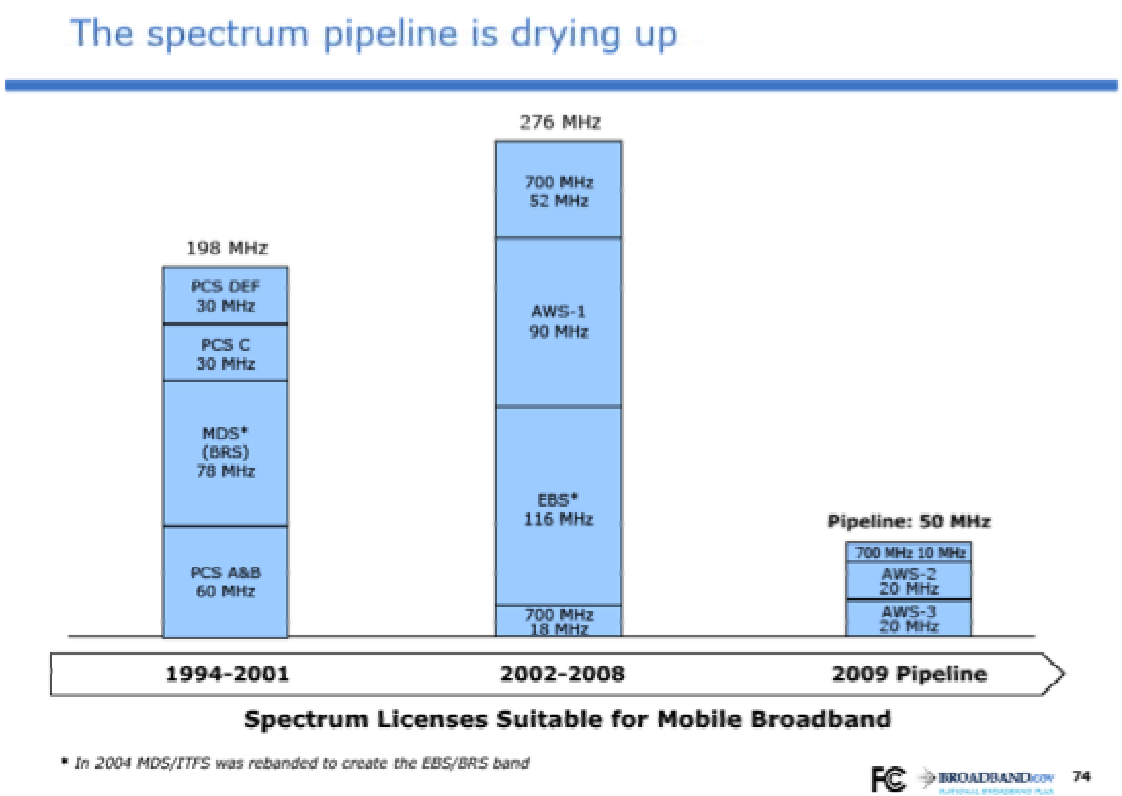
Need More Spectrum



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Wireless Policy Agenda

- Inventory and Efficiently Allocate Spectrum
- Find Additional Spectrum - Reallocation
- Encourage Investment and Innovation
- Reasonable Consumer Practices
- Ensure Growth of Wireless Data Services
- 700 MHz D Block - Nationwide Public Safety 12 to 16 billion to pay for Network

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Spectrum Inventory

- July 2009 Kerry Spectrum Inventory Bill Passes Senate Subcommittee
- Would require the FCC and National Telecommunications & Information Administration to report back to Congress with an inventory of the spectrum they manage and how it is being used.
- Would include how much unlicensed use is allowed, how much spectrum is being used in
  each band, including the TV and radio bands.
- NTIA and the FCC would also be required to create an online, "near real-time" database so the public could monitor any auction, transfer or change in allocation or assignment of frequencies.

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Spectrum Allocation 700 MHz

- Auction of 700 MHz TV broadcast frequencies completed
- Verizon Wireless purchased many A licenses and AT&T Mobility purchased most of B block (12 MHz paired)
- DISH Networks purchased most of E Block (6 MHz)
- Qualcomm purchased a few local B and E licenses
- Verizon Wireless acquired nationwide C block (22 MHz paired)
- Block C net neutrality requirements
- Likely 4G services - 2012

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Spectrum Allocation

- White Spaces Proceeding
  - Result to the switch to digital television
  - Spectrum 50 MHz and 700 MHz freed
  - On November 4, 2008, the FCC voted 5-0 to approve the unlicensed use of white space
  - Second Report and Order was released
  - Devices must both consult an FCC-mandated database and must also monitor the spectrum locally to confirm that no legacy wireless microphones, video assist devices or other emitters are present

Encourage Wireless Investment and Innovation

- NOI regarding the state of competition in the wireless industry (WT Dkt. 09-66)
- NOI on wireless innovation and investment (GN Dkt. 09-157)

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The need for investment

- Investment has declined
- Investment and innovation required across ecosystem:
  - Value to users & providers depends on end to end performance
  - Must invest in all areas: chipsets, user interface, software, network equipment and services, devices; etc
- Rapid innovation in some sectors must not be limited by bottlenecks in others
- Storm clouds may make investment more difficult:
  - Universal Service Fund
  - Public Switched Telephone Network

U.S. venture capital investments across communications sectors has declined

Telecommunications: Companies focused on the transmission of voice, data, wireless, and components. *Networking and Equipment*: Providers of data communication and fiber optics products and services. *Semiconductors*: Design, develop or manufacture semiconductor chips/microprocessors, diodes, and transistors. Source: MoneyTree Report, 2009.

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Reasonable Consumer Practices

- NOI on consumer protection in the communications marketplace (not limited to wireless industry) (CG Dkt. 09-158, CC Dkt. 98-170, and WC Dkt. 04-36)
- Early termination of service penalty (prorated)
- Consumer Billing and Disclosures
- Locking handsets -- limiting access to competitors' network
- Handset exclusivity (carrier and customer issue)
- Disabling handset functions (BlueTooth, WiFi)

Ensure Growth of Wireless Data - Data Roaming Investigation

- Whether automatic roaming obligations should extend to non-interconnected services or features, including information services, such as wireless broadband Internet access service, or other non-CMRS services
- FCC issued Further NPRM in August 2007 (Dkt. 05-143)
- Docket remains open and active
- Chairman Genachowski interested in addressing

DOJ Investigations

- DOJ reported to be probing AT&T and Verizon conduct but no evidence to support
  - Inquiries could involve both wireless and wireline units, although wireless seems to be primary focus
  - Preliminary stages; may not necessarily result in a formal investigation or litigation
- Not clear whether DOJ has authority over handset exclusivity, roaming, and other competitive issues:
  - Supreme Court has held that conduct that can be addressed by a regulatory agency cannot be the basis for an antitrust violation (Trinko)
  - Antitrust precedent also limits obligations of dominant firms to deal with their competitors

Universal Service

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Universal Service

- Universal telephony service has long been a goal of Federal and state regulatory policy
- 1996 Act directed FCC to establish explicit universal service funding mechanism
- Universal Service Fund (7-8B) to support 4 programs:
  - High Cost rural local (4-5)
  - Schools and Libraries (2)
  - Lifeline - Low Income (1)
  - Rural Health Care (50m)

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Universal Service: Contributions

- Providers of interstate “telecommunications services” contribute on end-user revenue
  - effectively a 12% tax (now 14)
  - in 2006 FCC increased wireless and VoIP but removed ILEC DSL
- Possible move to telephone number mechanism
  - Shift costs from heavy users to light users

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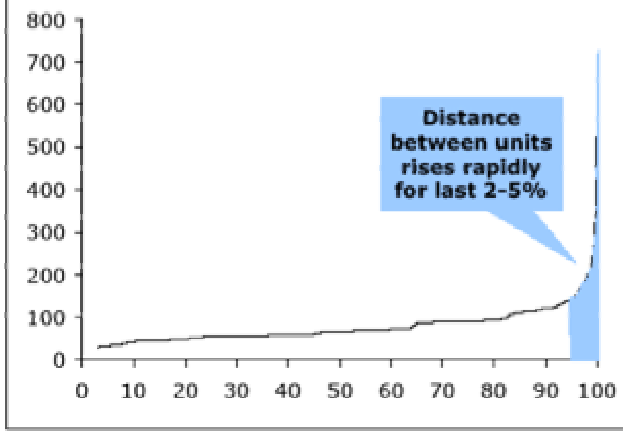
Promoting Universal Broadband

Economics of providing broadband to the rural U.S. are challenging because of low linear density

The average distance between homes increases rapidly from urban to rural areas . . .

Distance between U.S. housing units

Yards; percentile of U.S. households



. . . driving up costs and limiting revenue opportunities

- **Higher costs**
  - Last mile plant costs
  - Central office and node electronics density
  - Transport and transit costs
- **Limited revenue**
  - Low revenue density due to fewer homes per mile
  - Lower median income levels

Sources: Census Bureau; NJ Office of State Planning; OBI analysis

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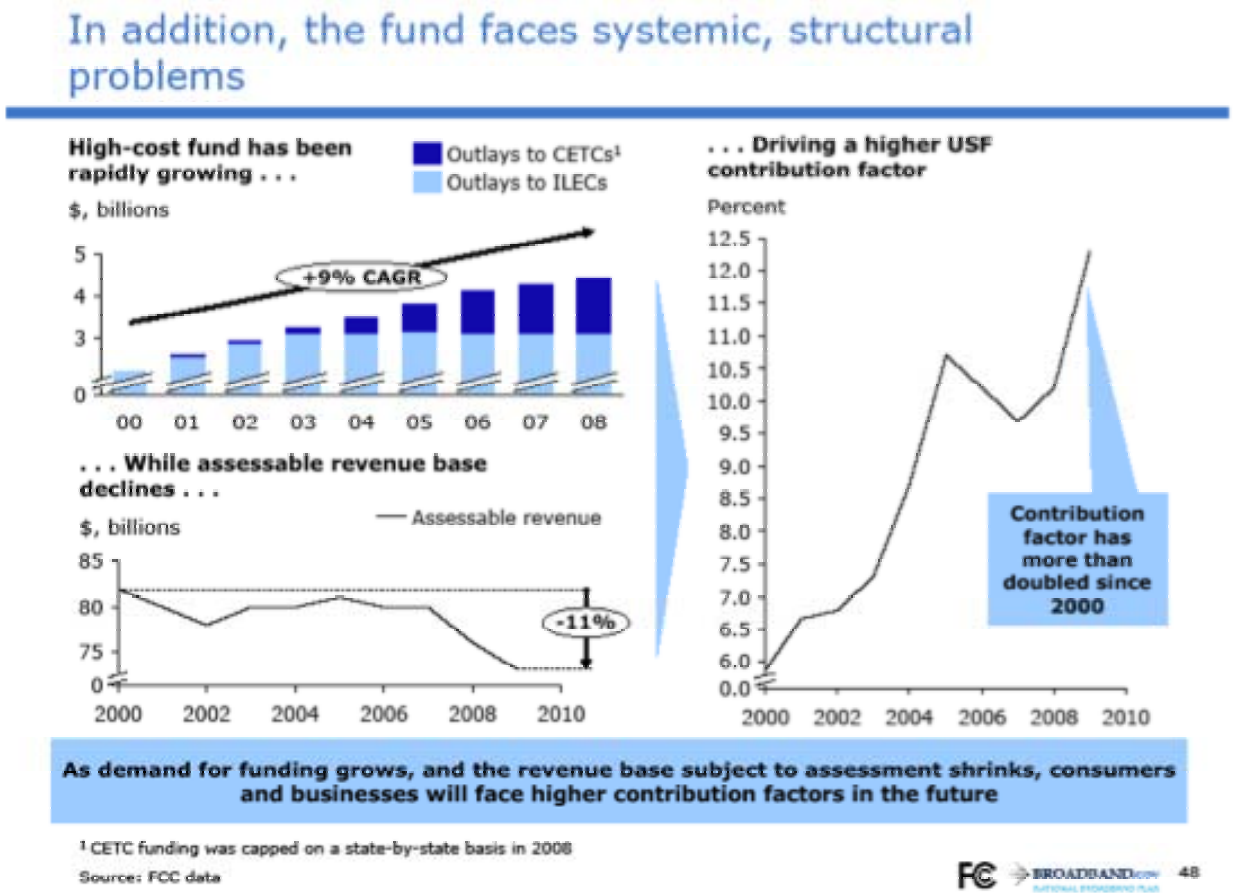
Universal Service Problems



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Universal Service Reform

- Possible Actions:
  - Change contribution mechanism
  - Assess USF surcharges on broadband connections
  - Support for broadband or VoIP or other applications

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Outlook
Intercarrier Compensation Issues
(abbreviated)

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Intercarrier Compensation Reform

- What is Intercarrier Compensation
- Relevance of Traffic Type (Info vs Telecom)
- Relevance of Traffic Origination Point
- Example
- Problems and Disputes
- Google Voice Example
- Reform Would Mitigate Litigation and Disputes

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Outlook

Government Role in Investment and R&D

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Tools to promote investment in R&D

- Federal Communications Commission
  - Address major issues such as interconnection, openness to devices
  - Encourage competition
  - Provide flexible rules & standards

- Federal Government Intervention:
  - ARRA & BTOP
  - Legislation
  - Economic incentives

- Federal Government investment in R&D

Outlook

Improving Access to Those With Disabilities

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Broadband usage and people with disabilities

- U.S. population with disabilities: **54 million**
  - 35 million with severe disabilities
  - Include speech, hearing, vision, mobility, and intellectual disabilities

- Internet usage: **less than half**
  - Fewer than 30.8% v. more than 63.6%
  - Research from 2003; needs updating

Sources: Brault, Matthew, *Americans with Disabilities: 2005*, Current Population Reports, P70-117, U.S. Census Bureau, Washington, D.C. 20008 at 3; Dobrasky, Kerry & Hargittai, Eszter, "The Disability Divide in Internet Access and Use." *Information, Communication and Society*. 9(3):313,325. June 2006 at http://eszter.com/research/a18-disabilitydivide.html

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Adoption and usage barriers for people with disabilities

Affordability Barriers

- Poverty rate 2-3 times higher for people with disabilities

- Specialized equipment, software adds to cost concerns
  - Screen readers > $1,000
  - Assistive deaf-blind technologies: $5,000-$10,000
  - Additional ongoing expenses (software maintenance, hardware repair, training)

Sources: Erickson, W. and Lee, C (2008). 2007 Disability Status Report: United States. Ithaca, NY: Cornell University Rehabilitation Research and Training Center on Disability Demographics and Statistics at 34; COAT Comments at 7; Karen Peltz Strauss Comments, Workshop Transcript at 56-57

Opportunities for advancing national purposes for people with disabilities

Broadband as platform to close the already existing gaps for people with disabilities

- Health care – Telemedicine/psychiatry with video sign language
- Education – Bookshare provides largest accessible digital library for people with vision and learning disabilities
- Public Safety – Potential of Next Generation 9-11 could be fully accessible

Sources: World Institute on Disability Comments at 2; ZeroDivide Comments at 7; NENA Comments at 3

Outlook

911 and Cyber security

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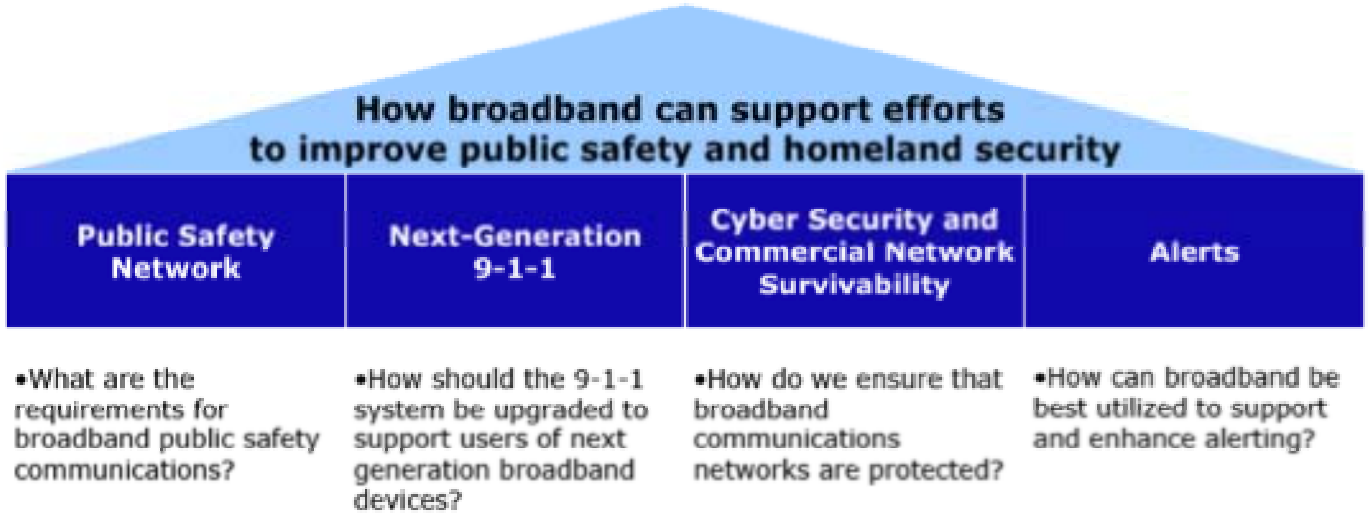
Public safety, homeland security and cyber security key questions



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Areas of focus and key issues

Areas of focus	Key issues
Nationwide Public Safety Network	• Costs and resources necessary to satisfy broadband needs • Whether specialized broadband needs can be satisfied by commercial broadband service provider
Next Generation 911	• Extent to which Next-generation 9-1-1 technologies and services are being deployed today • Regulatory roadblocks that may restrict more vigorous deployment
Cyber Security And Commercial Network Survivability	• Agency collaboration necessary to prevent, detect, and respond to cyber attacks • Extent to which cyber security best practices are being implemented by communications providers
Alerting	• Broadband technologies that could best enable improvements in alerting

Conclusions

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Conclusions

- Future is bright for innovators (applications, networks, edge devices)
- 2010 on will be the age of the true “information highway” Networks are roads and Content is Cargo
- Policy Makers Are Setting “Rules of the Road”
- Government Intends to Fuel Economic Growth and Productivity by Promoting Adoption of IP services and Applications and Hardware in virtually Every Sector of the Economy.

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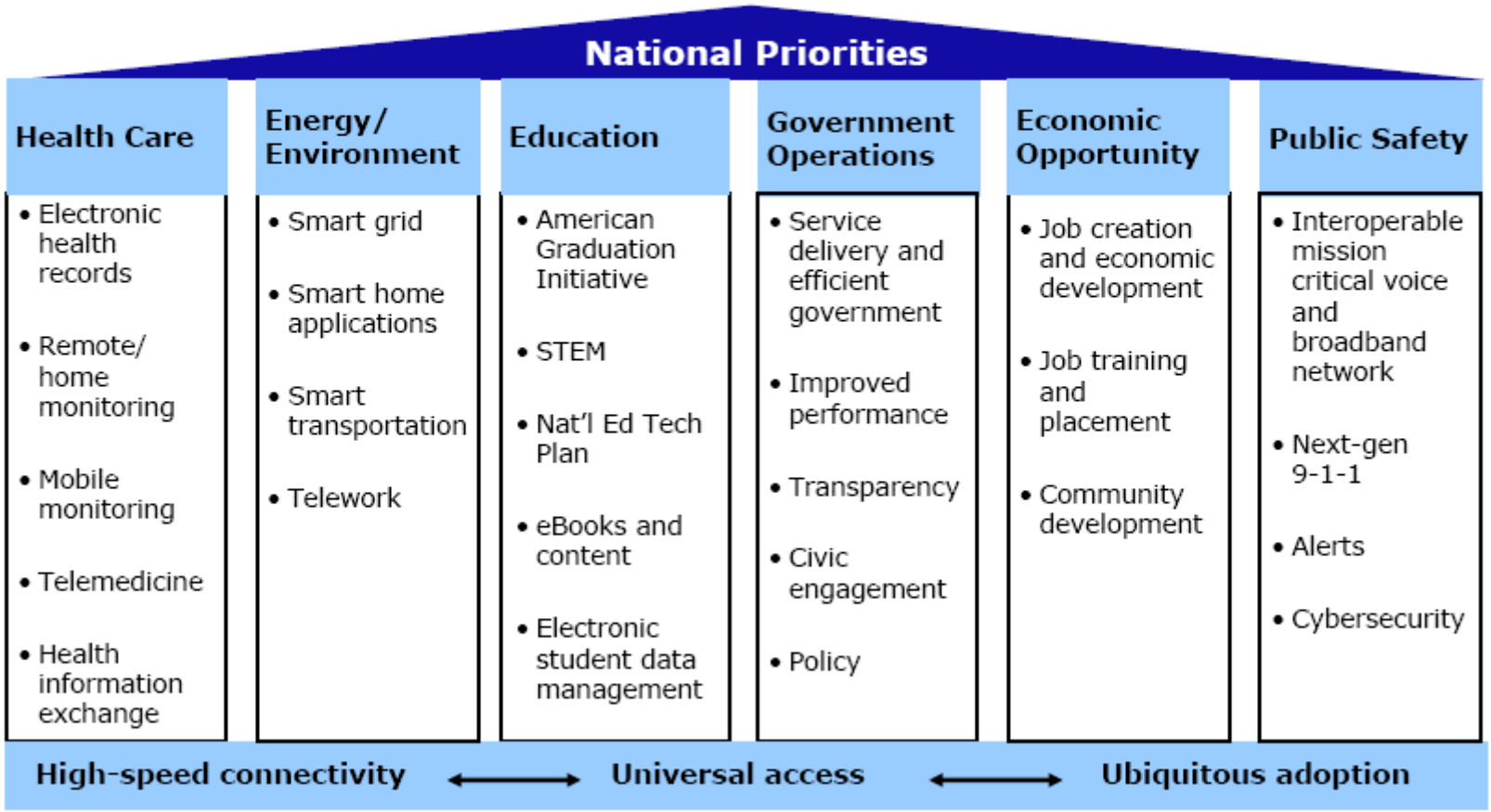
Broadband enables innovations necessary for the transformation



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