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
Federal Policy Objectives
Federal Policy Objectives

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

Broadband Deployment
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
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
First Notice of Funds Availability (NOFA) to release $4 billion
  • $2.5 billion for RUS BIP
  • $1.6 billion for NTIA BTOP
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
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
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
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
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.
FCC Broadband Workshops

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

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

### National Priorities

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<tr>
<th>Health Care</th>
<th>Energy/Environment</th>
<th>Education</th>
<th>Government Operations</th>
<th>Economic Opportunity</th>
<th>Public Safety</th>
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<tbody>
<tr>
<td>- Electronic health records</td>
<td>- Smart grid</td>
<td>- American Graduation Initiative</td>
<td>- Service delivery and efficient government</td>
<td>- Job creation and economic development</td>
<td>- Interoperable mission critical voice and broadband network</td>
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<tr>
<td>- Remote/home monitoring</td>
<td>- Smart home applications</td>
<td>- STEM</td>
<td>- Improved performance</td>
<td>- Job training and placement</td>
<td>- Next-gen 9-1-1</td>
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<tr>
<td>- Mobile monitoring</td>
<td>- Smart transportation</td>
<td>- Nat’l Ed Tech Plan</td>
<td>- Transparency</td>
<td>- Community development</td>
<td>- Alerts</td>
</tr>
<tr>
<td>- Telemedicine</td>
<td>- Telework</td>
<td>- eBooks and content</td>
<td>- Civic engagement</td>
<td></td>
<td>- Cybersecurity</td>
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<tr>
<td>- Health information exchange</td>
<td></td>
<td>- Electronic student data management</td>
<td>- Policy</td>
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**High-speed connectivity ↔ Universal access ↔ Ubiquitous adoption**

**Bingham**
Outlook
Key Telecommunications Policy Proceedings
Communications Policy Objectives

Broadband as foundation for sustained economic success: Accelerating the dynamic of the broadband ecosystem
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
Regulation of Broadband
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” -
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?
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
Network Neutrality
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
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?
Wireless & Spectrum Policy
Analysts project rapid growth in mobile broadband

Forrester Research

<table>
<thead>
<tr>
<th>Year</th>
<th>Mobile Data Users (millions)</th>
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<tr>
<td>2008</td>
<td>67</td>
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<tr>
<td>2009</td>
<td>84</td>
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<td>2010</td>
<td>100</td>
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<td>2011</td>
<td>114</td>
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<td>2012</td>
<td>127</td>
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<td>2013</td>
<td>139</td>
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Yankee Group

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Data Traffic Growth Relative to 2009</th>
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<tr>
<td>2009</td>
<td>1.0</td>
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<td>2010</td>
<td>2.7</td>
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<td>2011</td>
<td>6.3</td>
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<td>2012</td>
<td>11.9</td>
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<td>2013</td>
<td>17.7</td>
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<td>2014</td>
<td>23.3</td>
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<td>2015</td>
<td>29.4</td>
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Gartner

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<thead>
<tr>
<th>Year</th>
<th>Smartphone Penetration (%)</th>
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<tbody>
<tr>
<td>2008</td>
<td>15</td>
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<tr>
<td>2009</td>
<td>20</td>
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<td>2010</td>
<td>25</td>
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<td>2011</td>
<td>30</td>
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<tr>
<td>2012</td>
<td>35</td>
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Rysavy

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<tr>
<th>Year</th>
<th>Projected 3G/4G Traffic Growth Relative to 2009</th>
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<tbody>
<tr>
<td>2008</td>
<td>0X</td>
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<tr>
<td>2009</td>
<td>0X</td>
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<tr>
<td>2010</td>
<td>20X</td>
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<tr>
<td>2011</td>
<td>60X</td>
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<tr>
<td>2012</td>
<td>100X</td>
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<tr>
<td>2013</td>
<td>200X</td>
</tr>
<tr>
<td>2014</td>
<td>400X</td>
</tr>
<tr>
<td>2015</td>
<td>800X</td>
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</table>
Smartphones and Mobile PCs are driving traffic growth

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

Data usage relative to a standard handset

450X

30X

Standard  Smartphone  Mobile PC

Source: Cisco
Mobile data usage is exploding

Source: Cisco VNI, 2009
Spectrum available for mobile broadband has tripled
Need More Spectrum

The spectrum pipeline is drying up

Spectrum Licenses Suitable for Mobile Broadband

* In 2004 MDS/ITFS was rebanded to create the EBS/BRS band
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
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.
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
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)
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*

U.S. venture capital investments
Millions of dollars

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
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)
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
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

Distance between units rises rapidly for last 2-5%

... 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
Universal Service Problems

In addition, the fund faces systemic, structural problems

High-cost fund has been rapidly growing...

$ billions

- Outlays to CETCs
- Outlays to ILECs

+9% CAGR

... While assessable revenue base declines...

$ billions

Assessable revenue

-11%

As demand for funding grows, and the revenue base subject to assessment shrinks, consumers and businesses will face higher contribution factors in the future

1 CETC funding was capped on a state-by-state basis in 2008

Source: FCC data
Universal Service Reform

• Possible Actions:
  • Change contribution mechanism
  • Assess USF surcharges on broadband connections
  • Support for broadband or VoIP or other applications
Outlook
Intercarrier Compensation Issues
(abbreviated)
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
Outlook

Government Role in Investment and R&D
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
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

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)

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
Public safety, homeland security and cyber security key questions

**How broadband can support efforts to improve public safety and homeland security**

<table>
<thead>
<tr>
<th>Public Safety Network</th>
<th>Next-Generation 9-1-1</th>
<th>Cyber Security and Commercial Network Survivability</th>
<th>Alerts</th>
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</thead>
<tbody>
<tr>
<td>• What are the requirements for broadband public safety communications?</td>
<td>• How should the 9-1-1 system be upgraded to support users of next generation broadband devices?</td>
<td>• How do we ensure that broadband communications networks are protected?</td>
<td>• How can broadband be best utilized to support and enhance alerting?</td>
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# Areas of focus and key issues

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

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<td></td>
<td>• Electronic health records</td>
<td>• Smart grid</td>
<td>• American Graduation Initiative</td>
<td>• Service delivery and efficient government</td>
<td>• Job creation and economic development</td>
<td>• Interoperable mission critical voice and broadband network</td>
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<td>• Remote/home monitoring</td>
<td>• Smart home applications</td>
<td>• STEM</td>
<td>• Improved performance</td>
<td>• Job training and placement</td>
<td>• Next-gen 9-1-1</td>
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<td>• Mobile monitoring</td>
<td>• Smart transportation</td>
<td>• Nat’l Ed Tech Plan</td>
<td>• Transparency</td>
<td>• Community development</td>
<td>• Alerts</td>
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<td>• Telemedicine</td>
<td>• Telework</td>
<td>• eBooks and content</td>
<td>• Civic engagement</td>
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<td>• Health information exchange</td>
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<td>• Electronic student data management</td>
<td>• Policy</td>
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High-speed connectivity ↔ Universal access ↔ Ubiquitous adoption
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