Research Recommendations for the Broadband Taskforce Agenda

November 23, 2009

FEDERAL COMMUNICATIONS COMMISSION

NSF Mission and Goal

- The mission of NSF is to support basic, long-term research at the frontiers of science and engineering – both use-inspired and curiosity driven
  - "Bottom Up" approach to identify transformative research and fund the most promising people to conduct the research.
- NSF is one of 13 NITRD agencies that support research and development in networking and infrastructure
  - Within NSF, CISE plays an important role and contributes significantly to the research and development of broadband networking and technologies.

Broadband Research and Development

- NSF funds research projects in broadband that provide the foundation for the continued evolution of global scale networks and the services that depend on them.
  - Address a significant number of end-to-end network challenges in scalability, performance, trustworthiness, manageability and usability
  - Development of advanced network services and middleware necessary to support large-scale, distributed applications.
- The U.S. faces significant challenges to achieving its strategic social and economical goals in broadband technology and services.
  - According to a seminal survey of broadband subscribership, the U.S. ranks 15th among 30 OECD nations and continues to see its broadband adoption growth rate fall behind that of leading Asian and European countries.
  - Studies, which focused on metrics other than adoption growth rate, also show that the US continues fall behind leading Asian and European countries.

Broadband Research

- Broadband is an end-to-end issue
  - It is about the last-mile, the first-mile and anything in between
- Need to support research to understand the complexity of our systems and how to engineer them to be reliable, evolvable, trustworthy and easily manageable.
  - Investment is needed to support shared, heterogeneous and highly instrumented infrastructure for experimentation at-scale.

Broadband Networking at the Edges

- Despite significant advances in broadband research and development, the full potential of broadband technology has yet to be realized.
  - Emerging broadband services and applications have the potential to revitalize the economy and revolutionize several sectors of our society, including healthcare, education, commerce and entertainment.
  - The federal government should take action to increase the level of funding to enable radically innovative, game changing research in broadband technologies and services.
    - As the infrastructure gradually transitions toward fiber technology and "always-on" symmetric bandwidth, is likely to give rise to a new class of virulent security threats and privacy violation.
      - Need to explore new security frameworks to protect users and preserve privacy.

Other issues

- Structural changes and investment incentives must be explored in order to resolve fundamental obstacles to ubiquitous deployment of broadband technology
  - Attention must be paid to the ever-increasing complexity and quality-of-service requirements of content-rich, data-intensive services and applications
    - It is not clear that POTS-centric policy are applicabel in the context of emerging technologies and applications.
- The main factors that influence wide adoption and use of broadband technology in U.S. households include:
  - **Affordability**, cost issues
  - **Usability** due to lack of digital literacy skills or physical handicap,
  - **Interest** or perceived value of broadband
- Need to gain understanding of the most effective ways to address these issues and spur broadband adoption

Collaboration and Partnerships

- Partnerships, which commonly existed between academic and industrial **researchers,** propelled technological advances in broadband
  - Example: Gigabit Project of the 1980s-90s that probably accelerated the adoption of gigabit networks by several years
- Research in future generation of broadband networks and services will benefit greatly from the renewal of these partnerships.
  - The government, industry, academia and professional organizations should collaborate to encourage and facilitate greater intellectual interchange, **particularly between industry and academia,** to overcome the scientific and technological barriers to effective deployment of future broadband technology and services

Thank you!