

Extending Rural Broadband: Lessons from North America

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The US and Canada lag several other OECD countries in broadband penetration (U.S. ranking 15th and Canada ranking 10th); both countries also have significant rural and remote areas without broadband infrastructure. Both have also designated federal economic stimulus funds to extend broadband, and are reviewing definitions of universal service and support mechanisms to include broadband.

In 2009, the U.S. allocated \$7.2 billion in the American Recovery and Reinvestment Act through the Departments of Commerce (NTIA) and Agriculture (RUS) for infrastructure projects to extend broadband to unserved and underserved regions. Funds were also to be used for broadband mapping, to create more precise and updatable maps and data bases showing broadband availability (location, bandwidth, degree of competition, pricing, etc.) Also in 2009, as part of Canada's Economic Action Plan, Industry Canada was allocated CAD225 million to develop and implement a strategy to extend broadband coverage to as many unserved and underserved households as possible. The goals of these initiatives were both short-term job creation ("shovel-ready" construction) but more importantly, long term contributions to economic growth and diversification, and to more cost-effective delivery of education, health, and government e-services.

The U.S. also announced a Broadband Plan in March 2010. A major component of the plan is reform of universal service support to create a Connect America Fund and other mechanisms to achieve sustainable rural broadband. The Canadian regulator (CRTC) recently announced a proceeding review and update its basic service definition and support mechanisms.

This paper compares current national policies and strategies in Canada and the U.S. designed to extend broadband access in both countries, and initiatives for ongoing support for broadband sustainability. It concludes with lessons and findings to date that are relevant for other countries concerned with extending affordable broadband throughout rural and remote areas.

1. Introduction: Rural Communications Gaps

Broadband is becoming increasingly important for rural economic activities, and for the delivery of education, health care, and other social services. On a nationwide basis, Canada currently ranks 10th among OECD nations in broadband access and U.S. ranks 15th. Yet both Canada and the United States have major gaps in broadband availability in rural areas.

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Both the U.S. and Canada have long recognized the importance of communications for social and economic development. The Canadian Department of Communications' *Instant World* report heralded a new era of interconnected citizens and instantaneous access to information long before the Internet. Both countries invested in experimental communications satellites, and supported projects to explore their potential for telemedicine, distance education, and cultural exchanges. Commercial satellites were then launched to provide national television distribution, and voice and video services for remote areas, primarily in the North. In the 1990s, the U.S. proposed a National Information Infrastructure (NII) initiative to connect Americans to the Internet. Canada proposed a national Information Highway that would link Canadians and provide access to new information services.

Both countries recognized internal "digital divides" that left rural and remote communities and low income households cut off from these new opportunities, and both have adopted policy and funding strategies to attempt to bridge these gaps. Canadian federal initiatives have brought broadband to remote indigenous communities across the Arctic and in remote regions of some Canadian provinces. The U.S. has provided subsidies to provide broadband access to communities through schools and libraries, and grants and loans to rural carriers to upgrade their networks for Internet services. However, access can be expensive and quality of service inadequate in these remote areas. Also, there are still rural areas, typically with low population density, that do not have broadband access, or where broadband is only available via individual satellite installations.

2. Overview of Recent Initiatives

Each country has undertaken initiatives to provide broadband in remote and indigenous communities. The Canadian federal government sponsored several innovative projects to extend broadband to rural and remote areas in the 1990s, such as BRAND (Broadband Access for Rural and Northern Development Pilot Program). However, no new funding has been provided to continue or replace BRAND. The government has subsidized satellite service for northern communities through its Northern Satellite Initiative, which continues through 2011.¹ Satellite broadband is also available throughout much of rural Canada, but at prices significantly higher than comparable service (on the same Anik satellite) in the U.S.

In the U.S., federal agencies provide funding for rural telecommunications infrastructure. The Rural Utilities Service (RUS) in the U.S. Department of Agriculture provides low-interest loans and some grants to rural communications carriers to extend and upgrade their networks. The National Telecommunications and Information Administration (NTIA) in the Department of Commerce has administered several grant programs that included support for rural broadcasting and communications.

In 2009, both countries announced broadband infrastructure grants as part of national economic stimulus initiatives. These are primarily one-time infrastructure

investments for capital expenditure (CAPEX). The U.S. American Recovery and Investment Act (Recovery Act or ARRA) signed in February 2009 appropriated \$7.2 billion “to begin the process of significantly expanding the reach and quality of broadband services.” Grants administered by NTIA were to be awarded for infrastructure, public computer centers, projects to foster sustainable broadband adoption, and for broadband data collection and mapping. The RUS received \$2.5 billion specifically for *rural* infrastructure projects. Other stimulus initiatives include funding for electronic health record systems, ICTs in education, “smart grids” to manage distribution and utilization of energy, and communication systems for public safety and security.²

In September 2009, Industry Canada announced “Connecting Rural Canadians,” a CAD225 stimulus program to extend “essential infrastructure” in remote and rural areas.³

In March 2010, the FCC announced a National Broadband Plan. Its proposals include creation of a Connect America Fund and reform of current universal service policies to provide incentives to extend broadband services. The plan’s goals included *inter alia*:

- At least 100 million U.S. homes should have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.
- Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose.
- Every community should have affordable access to at least 1 Gbps broadband service to anchor institutions such as schools, hospitals and government buildings⁴

Canada has no explicit national broadband policy or plan, but in January 2010, the CRTC announced hearings to consider reviewing and updating universal service obligations and objectives.⁵

The following sections analyze and compare these funding and policy initiatives.

3. U.S. Broadband Stimulus Initiatives

U.S. broadband stimulus programs authorized by the Recovery Act are administered by the Rural Utilities Service (RUS) in the Department of Agriculture and the National Telecommunications and Information Administration (NTIA) in the Department of Commerce.

3.1. Broadband Mapping

For several years, U.S. regulators and policy makers have been concerned that no detailed and current data were available on the location and quality of broadband services throughout the U.S. Accordingly, the Broadband Data Improvement Act (BDIA) mandated NTIA to improve data on the deployment and adoption of broadband service to assist in the extension of broadband technology across all regions of the United States,⁶ and the Recovery Act required NTIA to create and make available a comprehensive,

interactive, and searchable national broadband map by February 17, 2011.⁷ The ARRA allocated \$350 million which will fund one entity in each state to gather and verify data on the availability, speed, location, and technology type of broadband services. The data collected and compiled will also be used to develop publicly available state-wide broadband maps and to prepare the national broadband map. The national map is to be searchable by address to show available service and providers in the corresponding census block or street segment.⁸

Ideally, the national broadband map would have been available to guide planners in identifying areas where connectivity is inadequate, and in developing a national broadband plan. However, the lack of funding before the Recovery Act and the lead times required to allocate funds and develop the maps resulted in stimulus grants being awarded and the national broadband plan being announced (as mandated) in 2010, while the initial map will not be available until 2011.

3. 2. Rural Utilities Service (RUS): Broadband Infrastructure Program (BIP)

Based in the Department of Agriculture, the Rural Utilities Service (RUS) provides low-cost loans to extend and upgrade the infrastructure of rural utilities including telecommunications. Initially, it funded rural utility companies and cooperatives to provide voice communications in unserved areas; it now makes loans to rural providers to upgrade their networks to offer broadband services, and also supports rural telemedicine and distance education projects.⁹

The Recovery Act allocated \$2.5 billion for rural infrastructure projects to the RUS, which is administering these funds through the Broadband Infrastructure Program (BIP). Key elements of the BIP include:

- **Projects are targeted at rural areas:** At least 75 percent of the project area must be “in a rural area that lacks sufficient access to high speed broadband service to facilitate rural economic development.”
- **Funding and project criteria:** Approximately \$2.4 billion was made of available, of which up to \$1.2 billion was for last mile projects. Of this funding, \$400 million was available for remote area projects, while the additional \$800 million could be used in remote or non-remote (but rural) areas. Up to \$800 million was available for middle mile projects. Unused funds in one category could be allocated to another category. Up to \$325 million was available as a national reserve fund.
- **Funding mechanisms:** Awards could be in the form of loans or a combination of grants and loans.

3. 3. NTIA: Broadband Telecommunications Opportunities Program (BTOP)

The Recovery Act allocated \$4.7 billion to NTIA for broadband mapping, and for the following goals which are being addressed through the Broadband Telecommunications Opportunities Program (BTOP):

- Provide access in unserved areas and improved access in underserved areas;
- Provide broadband education, awareness, training, access, equipment and support;
- Improve access and use by public safety agencies;
- Stimulate broadband demand, economic growth, and job creation.

The following are key elements of BTOP:

- **Project Categories:** Project support was available for the following categories:
Broadband infrastructure projects
Public computer center projects
Sustainable broadband adoption projects.
- **Regional Distribution:** The ARRA stated that the Assistant Secretary of Commerce shall award at least one grant to each state “to the extent practical” by the end of the funding period (September 30, 2010).
- **Matching:** Awardees were required to produce matching funding of at least 20 percent of the grant cost.

4. Canadian Stimulus Initiatives: Broadband Canada: Connecting Rural Canadians

Like the U.S. stimulus program, Connecting Rural Canadians is designed “to make broadband service available to as many unserved and underserved households as possible.” However, there are some differences in the specifics:

- Industry Canada developed maps of broadband availability before issuing the call for proposals. Based on the mapping data, Geographic Service Areas (GSAs) were defined for which proposals were sought.
- The Canadian program is specifically targeted at rural areas.
- Broadband is defined as a minimum 1.5Mbps (downstream).
- Eligibility: Recipients may be private sector providers, nonprofit organizations, or consortia, as well as public sector “provincial/territorial entities that build and operate broadband infrastructure.”
- Matching: The program will fund up to 50 percent of eligible project costs.

Thus, while similar in intent, the Canadian program differs in being exclusively rural and using a definition of broadband that is twice as fast as that adopted in the US for stimulus support. Further, it undertook preliminary mapping to identify service gaps before issuing its request for proposals, although greater detail (down to the block level) is required in the U.S. maps that are to be ready in 2011. The Canadian program also allows for funding to public sector entities at the provincial/territorial level, and requires a higher match (50 percent vs. 20 percent) for grant support. (All support is in the form of grants, whereas the RUS component in the U.S. includes loans.)

5. The U.S. National Broadband Plan

In March 2010, the FCC announced a National Broadband Plan. Its proposals include creation of a Connect America Fund and reform of current universal service policies to provide incentives to extend broadband services. The plan's goals included *inter alia*:

- At least 100 million U.S. homes should have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.
- Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose.
- Every community should have affordable access to at least 1 Gbps broadband service to anchor institutions such as schools, hospitals and government buildings.¹⁰

The plan provides a detailed analysis of the steps the FCC has determined will be required to achieve these goals under four major headings:

- Establishing competition policies (including pricing, privacy, and transparency);
- Ensuring efficient allocation and use of government owned and government-influenced assets (such as spectrum and rights-of-way);
- Creating incentives for universal availability and adoption of broadband;
- Updating policies, setting standards and aligning incentives to maximize use for national priorities (in fields such as health, education and public safety).¹¹

The Broadband Plan is to be implemented through numerous reviews and reforms involving universal service, spectrum allocations, carrier compensation, public safety coordination, monitoring of speed and quality of service, and other initiatives.

The steps designed to achieve universal access to broadband include:

- Carry out a “once-in-a-generation transformation” of the Universal Service Fund over the next ten years to support broadband service by converting existing subsidy mechanisms over time from “POTS” (plain old telephone service) to broadband, without increasing the size of the fund over current projections.
- Upgrade the E-rate program (that subsidizes Internet connectivity for schools and libraries; see above), to benefit students and others across the country by making broadband more accessible (possibly by providing support for additional means of community access through schools or other local institutions).
- Reform and upgrade current rural health connectivity subsidies “to connect more public health facilities to high-speed Internet facilities and to foster telemedicine applications and services”.

- Create a Health Care Infrastructure Fund to support deployment of dedicated health care networks to underserved areas.
- Create a Connect America Fund to extend broadband service to unserved areas and to ensure affordable broadband service in high-cost areas. The goal is provision of affordable broadband with at least 4 mbps actually download speed.
- Create a Mobility Fund to upgrade wireless coverage throughout the country to 3G or better.¹²

6. Sustainability through Universal Service Funds

6.1. U.S and Canadian Universal Service Reform

Both countries recognize that one-time stimulus or other investment funding will not ensure access to broadband for all regions or customers. Universal service funds, as described below, are a major mechanism to provide for sustainability. The FCC has begun the process of reviewing universal service support programs as a key strategy to implementing the National Broadband Plan. As noted above, it intends to replace some existing support funds with a Connect America Fund. Principles proposed for the new Connect America Fund(CAF) include: (1) “CAF should only provide funding in geographic areas where there is no private sector business case to provide broadband and high-quality voice-grade service;” (2) “There should be at most one subsidized provider of broadband per geographic area;” (3) “The eligibility criteria for obtaining broadband support from CAF should be company- and technology-agnostic so long as the service provided meets the specifications set by the FCC;” (4) “The FCC should identify ways to drive funding to efficient levels, including market-based mechanisms where appropriate, to determine the firms that will receive CAF support and the amount of support they will receive;” and (5) “Recipients of CAF support must be accountable for its use and subject to enforceable timelines for achieving universal access.” The National Broadband Plan concludes that private investment alone is unlikely to extend broadband in some areas of the country with low population density.¹³

The FCC announced a Notice of Inquiry and Notice of Proposed Rulemaking on these universal service proposals on April 21, 2010.¹⁴ The first steps are underway through a series of FCC Notices of Inquiry (NOIs) and Notices of Proposed Rule-Making (NPRMs) on universal service topics including:

- High cost operator support mechanisms
- Low income customer support mechanisms (Lifeline and Link-Up programs)
- Subsidies for schools and libraries (the E-Rate program).

These subsidies were designed to provide ongoing support to provide sustainable services for regions or customers unlikely to be able to cover costs of providing the services, as discussed in more detail below.

Canada has not taken an integrated approach to broadband sustainability. Industry Canada has terminated or is phasing out sustainability programs for community Internet access. Examples of operating support include federally subsidized satellite service for northern communities through the Northern Satellite Initiative, which continues through

2011, but no follow-on support has been announced.¹⁵ Another federal initiative, the Community Access Program (CAP) has facilitated free community Internet access at more than 3,000 locations across Canada since 1994. The federal government announced severe cuts to the \$14-million-a-year program that would halt funding for 93 percent of the CAP sites in March 2010, but then rescinded the cuts, stating that funding would come from other sources (apparently Connecting Rural Canadians).

However, the Canadian Radio Television and Communications Commission (CRTC) has initiated a consultation in 2010 to review and update its basic service definition and support mechanisms. At present, the CRTC's basic service objective for local exchange carriers established in 1999 includes individual line local service with touch-tone dialing provided by a digital switch with dial-up access to the Internet at local rates.¹⁶ If it were to change that definition to include broadband (using Industry Canada's recommended minimum download criterion of 1.5 Mbps or greater), it would provide a *de facto* sustainability mechanism to support rural broadband.

6.2. International Experience with Universal Service Funds

The means of financing expansion of services to high cost and/or low income regions in the monopoly era generally relied on internal cross subsidies from high margin services. Typically a regulator would designate regions to be served or quality of service (QOS) targets to be met as a condition of granting or renewing a licence, and would authorize tariffs designed to generate revenue from services such as international calls or domestic long distance that could be then directed to subsidizing expansion of or rates for services in other areas.

With the introduction of competition, subsidies had to become explicit, so that providers could not transfer revenues from still-monopoly services to competitive offerings in order to drive out competitors. Funds for such subsidies could come from government budgets, but to avoid relying on governments, mechanisms were set up to channel some revenue from all the operators (or all in a certain category) into a fund for redistribution as subsidies to address universal service or access.

Universal Service Funds (USFs) to subsidize installation of telecommunications infrastructure, have been established in at least 52 countries.¹⁷ In general, the rationale for these funds is based on the assumption that capital costs are too great and/or demand is too limited among poor or isolated residents to attract investment from the telecommunications sector. The source of funds is generally incumbent providers through a tax on their revenues or profits, or a requirement that a small percentage of their revenue be transferred to the fund.

However, by the time most universal service funds were established or ready to distribute funds, requirements had changed. Funding was still needed to reach some rural areas where projected costs for basic telephony were too high and revenues too low to attract private investment, but a new gap or "digital divide" had emerged in disparities in access to the Internet. Thus, while universal service funds generally prioritize support for

voice telephony), several countries, particularly developing countries and emerging economies, are now expanding definitions to include mobile telephony and Internet access.¹⁸ Changes in criteria for universal service funds include:

- **Fixed to mobile:** Funds began by distributing funds primarily or exclusively to fixed line operators. Now funds generally also support mobile operators to extend coverage to unserved regions or to improve coverage.
- **Narrowband to broadband:** As the Internet has become increasingly important as a platform for commercial and development services and a means to enhance education and improve health care and other social services, universal service funds have begun to provide funding for Internet connectivity, including broadband.
- **Service vs. Access:** Community access has now become a baseline criterion for Internet services, through facilities such as telecentres, libraries, Internet cafes or other public facilities.

A review of 52 universal service funds by the author identified several key lessons:¹⁹

- **Including mobile:** Early fund criteria emphasized or required investment in fixed wireline networks to increase teledensity. Most now recognize that mobile wireless is much more cost effective in increasing access to basic telephony, particularly in exurban and rural areas in countries where no wireline infrastructure exists
- **Broadening mandates:** Many funds now include some form of Internet access, through increasing available bandwidth and/or supporting public access through telecentres, Internet cafes and other entrepreneurs, libraries, post offices, schools, etc.
- **Using incentives:** The process of allocating funds should foster innovation – in technology, in operation of services, in applications. It also should reward efficiency and quality of service (QOS). Incentive-based funding also requires that tenders are open to all qualified providers, not just to incumbents.
- **Technological neutrality:** Requirements should specify coverage, bandwidth, QOS, target price etc – but not technology. Voice service can be provided by wireless as well as wireline technologies; Internet access can be delivered by various forms of licensed and unlicensed wireless, as well as over DSL, fiber, cable, and satellite – still an important option in isolated areas, mountainous regions, and islands.
- **Smart subsidies?** Some analysts recommend that funds be allocated exclusively for “smart subsidies,” defined as “a once-only incentive that is designed to be results-oriented, and does not distort the market or add to the burden of operators

in the sector in the long run.” However, some services, such as Internet for schools or libraries, may require ongoing subsidies, as is done through the U.S. E-rate program (see below).

- **Serving the public interest:** Many elements are necessary to ensure that the fund serves the public interest – both in implementation and in process. Objectives should be clear; there should be consultation with all the stakeholders including major providers, new providers, and users, particularly target groups such as rural residents, students and teachers, social service providers and NGOs. And access must be defined for local conditions – to include both availability and affordability.
- **Monitoring and Evaluation:** Funds must ensure that projects they support are monitored for implementation as specified, and for ongoing QOS. The funds themselves should be subject to regular review (e.g. every 3 to 5 years) to ascertain how revenues have been distributed, what increases in access have been achieved, and what impact the investments have had on usage in previously unserved and underserved areas, and the developmental impact of such usage. Ideally, funds should be subject to sunset provisions, so that if the review determines that the fund is ineffective or no longer needed, it can be disbanded and funds can be rebated to subscribers or used for other related purposes.

7. Operational Support Mechanisms

Many universal service funds are used only for capital investment, with the implicit assumption that once installed, revenues will cover operating costs. However, in high cost areas e.g. with low population densities and/or difficult terrain (hills, mountains, islands, lack of road access, etc.) and in some low income areas, revenues may not be sufficient to cover ongoing costs. Among the approaches to provide ongoing support are:

Universal Service Obligations:

Traditionally, governments through their own budgets or USF resources have identified unserved regions and provided subsidies to incumbents or “carriers of last resort” to extend facilities and in some cases to subsidize prices if these areas are considered unprofitable. Although this approach can accomplish universal service goals, it has several potential flaws. The incumbent or designated carrier may have no incentive to be efficient or innovative in its choice of technology and its installation and maintenance if these costs are directly subsidized. Second, the carrier may have no incentive to maintain adequate quality of service (QOS) if it assumes these areas are unlikely to generate significant revenue. And third, the carrier may demand special treatment or concessions in a liberalized environment because of its universal service obligations.

Reverse Auctions:

An alternative used in several countries to create incentives for efficient investment in rural areas is the reverse auction. Opportunities to install and operate facilities in designated unserved or underserved areas are put to competitive bid. The carrier that requests the lowest subsidy wins the right to serve the territory. Terms may include performance by specific roll-out dates, maintenance of approved QOS, and multiyear licences (in some cases with exclusivity for a specified period). Chile's success with reverse auctions is the best known example. Chile's Telecommunications Development Fund was created in 1994. Regional and local governments submitted requests for payphones to the regulator, which determined the maximum allowable subsidy. The resulting average subsidy was US\$3,600 per payphone, compared to estimated costs of \$10,000 to \$20,000. Chile managed to cover 66 percent of designated villages using only 54 percent of financing available; 656 villages required no subsidy.²⁰ Other countries using a form of reverse auction or minimum subsidy tender include Colombia, Guatemala, India, Nepal, Paraguay, Peru, Romania, Venezuela and Uganda.²¹ In the U.S., the Federal Communications Commission (FCC) is considering reverse auctions as part of its agenda to extend universal broadband and reform universal service subsidies (discussed below).

Subsidizing Users: Institutional Access:

Some countries include support for institutions that would make Internet services available to the public, such as post offices and libraries, and schools that make facilities available to the public as well as to students. Internet access for schools in general (without necessarily including public access) is subsidized by universal service funds in several countries including Afghanistan, Chile, Colombia, Macedonia, Malaysia, Mongolia, Paraguay, South Africa, Uganda and the United States.²²

In the US, the E-rate (short for "education rate") created by the Telecommunications Act of 1996 provides discounts on a wide variety of telecommunications, Internet access and internal connections for schools and libraries. The applicable discount rate is based on a school's economic need and whether it is located in an urban or rural area. Up to \$2.25 billion worth of discounts can be made available each year. Approved costs are billed directly to USAC, up to the limit of the subsidy. Schools and libraries are responsible for the remainder, and must demonstrate that they can cover their portion of the costs.²³

Approved schools and libraries post their requirements online, where they are open for competitive bids. If no competitors respond during the designated time period, the school or library may contract with the local incumbent operator. The result in many small communities has been that the school has become an anchor tenant for Internet access. In Alaska, which has many remote villages similar to indigenous communities in the Canadian North, the E-Rate subsidy had brought Internet access to most village schools. One of the competitive providers concluded that the school subsidy was critical to its business case to bring broadband to the villages (primarily by satellite), and

subsequently installed broadband wireless to cover the villages, with price for individual access not to exceed the price in Anchorage, the largest city.²⁴

Connectivity for rural health services is also supported from universal service funds in the U.S. In Alaska, the AFHCAN (Alaska Federal Health Care Access Network) program relies on this subsidy to connect more than 250 sites including links between more than 150 village clinics and regional hospitals.²⁵

Innovative features of the E-Rate program are:

- **Awards to the user:** The E-Rate funds are awarded to the user (school or library) rather than directly to the carrier or vendor. This approach can empower the schools and libraries as customers of the carriers, rather than applicants.
- **Anchor Tenants:** Subsidy of institutional users such as schools and libraries creates “anchor tenants”, customers with sufficient funds to become long term subscribers. With guaranteed revenues, providers may have incentives to expand into previously unserved or underserved communities.
- **Competitive bids:** The E-Rate process requires competitive bids for approved services through an online process. This approach not only creates incentives to minimize costs, but also encourages new entrants in addition to incumbents and large vendors to provide equipment and services for schools.

User Subsidies: Individuals:

Another means of subsidizing users would be to provide vouchers for broadband access to households in regions where costs of providing services are high because of isolation of low population density. Vouchers should be usable for discounts from any broadband provider. This approach could encourage competition to offer broadband services in marginal areas.

8. Beyond Infrastructure: Lessons to Date

Access to broadband involves three critical components:

- Availability
- Affordability
- Sustainability.

The stimulus programs in the U.S. and Canada are aimed at increasing availability, through funding infrastructure investments primarily in rural and remote regions. Reforms of universal service policies in both countries are needed to address the issues of sustainability for service providers in high cost regions. The U.S. also includes user subsidies for schools and libraries, which in turn provide funding for operators to extend services to these anchor tenants in rural communities.

Affordability is addressed in the U.S. through subsidies for voice services for low income customers. The FCC is considering expanding the service offerings to include broadband. In Canada, consumers are advocating similar treatment,²⁶ but there are no individual or institutional subscriber subsidies for any services.

The next steps in closing the digital divide and deriving socio-economic value from infrastructure investments are to increase adoption and to develop and implement applications that address social and economic needs for information, e-services, access to markets, consultation with specialists, etc. National data in the US shows lower levels of broadband adoption among lower income, rural, and some minority populations. Among non-adopters, lack of relevance is cited as main reason for not having broadband at home.²⁷ Research is needed to increase our understanding of reasons for nonadoption, to develop strategies to encourage adoption, and to identify or develop relevant applications for users with limited ICT or English language skills.

Broadband infrastructure initiatives should be evaluated not only to determine whether the funds resulted in the intended broadband deployment, but to assess impacts the increased access has had on availability and effectiveness of health services, education and training, government programs and services, new or increased economic activities, etc. The goal is to ensure that broadband policies will result in services that are available, affordable, and sustainable.

NOTES

- ¹ Industry Canada. “Government of Canada Announces Broadband Access Via Satellite for 52 Remote Communities.” Ottawa: May 20, 2004. See <http://www.ic.gc.ca/eic/site/ic1.nsf/eng/02381.html>
- ² American Recovery and Reinvestment Act of 2009, (Pub.Law. 111-5). See www.recovery.gov.
- ³ Industry Canada. “Broadband Canada. Connecting Rural Canadians.” See www.ic.gc.ca/eic/site/719.nsf/eng/home
- ⁴ Federal Communications Commission. National Broadband Plan, March 16, 2010. See <http://download.broadband.gov/plan/national-broadband-plan.pdf>
- ⁵ Telecom Notice of Consultation CRTC 2010-43, *Proceeding to review access to basic telecommunications services and other matters*. See www.crtc.gc.ca/eng/archive/2010/2010-43.htm
- ⁶ Broadband Data Improvement Act (BDIA), Title I of Public Law 110–385, 122 Stat. 4096 (Oct. 10, 2008)
- ⁷ American Recovery and Reinvestment Act of 2009 (Recovery Act), Public Law 111–5 (Feb.17, 2009).
- ⁸ National Telecommunications and Information Administration State Broadband Data and Development Grant Program Notice of Funds Availability, July 8, 2009.
- ⁹ See www.usda.gov/rus/telecom/index.htm
- ¹⁰ Federal Communications Commission. *Connecting America: The National Broadband Plan*. Washington, DC, March 2010.
- ¹¹ Federal Communications Commission. *Connecting America: The National Broadband Plan*. Washington, DC, March 2010.
- ¹² Federal Communications Commission. “FCC Announces Broadband Action Agenda.” Press Release. Washington, DC, April 8, 2010.
- ¹³ Federal Communications Commission. *Connecting America: The National Broadband Plan*. Washington, DC, March 2010.
- ¹⁴ Federal Communications Commission. Notice of Inquiry and Proposed Rulemaking: “In the Matter of Connect America Fund; A National Broadband Plan for Our Future; High-Cost Universal Service Support.” Washington, DC, April 21, 2010.
- ¹⁵ Industry Canada. “Government of Canada Announces Broadband Access Via Satellite for 52 Remote Communities.” Ottawa: May 20, 2004. See <http://www.ic.gc.ca/eic/site/ic1.nsf/eng/02381.html>
- ¹⁶ . CRTC. Notice of Consultation and Hearing: Proceeding to review access to basic telecommunications services and other matters, announced January 28, 2010.

See www.crtc.gc.ca/eng/archive/2010/2010-43.htm

¹⁷ Based on information available from the International Telecommunications Union, the World Bank (InfoDev ICT Regulators Toolkit), and Regulatel.

¹⁸ See Hudson, Heather E. “Defining Universal Service Funds: Are They Accelerators or Anachronisms?” *Intermedia*, Vol. 38, Issue. 1, March 2010. See www.iicom.org .

¹⁹ See Hudson, Heather E. “Defining Universal Service Funds: Are They Accelerators or Anachronisms?” *Intermedia*, Vol. 38, Issue. 1, March 2010. See www.iicom.org .

²⁰ Wallsten, Scott, “Reverse Auctions and Universal Telecommunications Service: Lessons from Global Experience.” *Federal Communications Law Journal*, vol. 61, No. 2, March 2009, pp. 373-394.

²¹ INTELECON. “Universal Access Funds: Update December 2007.” See www.Inteleconresearch.com

²² See Hudson, Heather E. “Defining Universal Service Funds: Are They Accelerators or Anachronisms?” *Intermedia*, Vol. 38, Issue. 1, March 2010. See www.iicom.org

²³ Hudson, Heather E. “The Future of the E-Rate: U.S. Universal Service Fund Support for Public Access and Social Services” in Schejter, Amit, ed., ... *and Communications for All: An Agenda for a New Administration*. Lanham, MD: Lexington Books, 2009.

²⁴ Hudson, Heather E. *From Rural Village to Global Village*. New York: Routledge, 2006.

²⁵ See www.afhcan.org and Hudson, Heather E. *From Rural Village to Global Village*. New York: Routledge, 2006.

²⁶ Hudson, Heather E. Testimony submitted on behalf of the Public Interest Advocacy Centre CRTC Consultation 2010-43: Proceeding to Review Access to Basic Telecommunications Services and Other Matters. Ottawa: CRTC, April 2010.

²⁷ FCC. Presentation at September Commission Meeting, September 29, 2009. See <http://reboot.fcc.gov/open-meetings/2009/september>