

by Heather E Hudson

Rural broadband: Strategies and lessons from North America

Are two countries moving in different directions?

The US and Canada lag behind several other OECD countries in broadband penetration (US ranking 15th and Canada ranking 11th);¹ both countries also have significant rural and remote areas without broadband infrastructure or with limited Internet connectivity. Both countries have provided funding for capital investments in infrastructure through stimulus funds and other programs; both are currently reviewing universal service fund support mechanisms for operational subsidies to determine whether they should be revised to include broadband.

Access: Availability, Affordability, Adoption...and Sustainability

Providing access to broadband requires sufficient incentives to invest in infrastructure (capital expenditure or capex) and sustainability to generate sufficient revenues for ongoing operating expenses (opex). Access from the providers' perspective can be defined in terms of houses passed (for wireline technologies such as optical fiber and coax or hybrid fiber/coax or copper) and coverage for wireless technologies.

However, from the users' perspective access may be viewed differently. For example:

- » Household access: with devices and connectivity in each dwelling;
- » Personal access: using mobile phones, PDAs, laptops, netbooks, e-pads, etc.;

- » Institutional access: for government agencies, public safety, health care facilities, etc.;
- » Public access through a variety of sites such as post offices, telecenters, libraries, Internet cafés, other commercial shops, nonprofit organizations, community centers, etc.;
- » Student access at schools, community colleges, distance education centers, etc.;
- » Geographic access, i.e. within specified distance of access point;
- » Specified jurisdictions as those with a certain administrative function (e.g. district centre, county seat), or minimum population, etc.

These indicators refer primarily to *availability*. Yet access to broadband requires not only *availability* but also *affordability*, plus relevant applications and the skills to put them to use in order to achieve *adoption*.

Each of these requirements has been addressed through various government policies and strategies. The stimulus funds for broadband in the US deal primarily with capex, with some projects also addressing community access and user skills. Canadian stimulus funds address capex exclusively. Sustainability for providers and affordability for users may be addressed through universal service policies. In the US these policies are under review as part of the proposed reforms in the National Broadband Plan. In Canada, the Canadian Radio Television Commission (CRTC) is re-examining defini-

tions of basic service and the need for service subsidies. More detailed analysis is given below.

Broadband and National Development

Both the US 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 US 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 US 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 relatively expensive individual satellite installations.

In 2010, the US and Canada announced initiatives intended to implement strategies that focus on broadband as a key driver of national social and economic development. The US National Broadband Plan examines the importance of competition and adequate spectrum to foster innovation and investment in the ICT sector. It identifies key "National Purposes" including health care, education, energy and the environment, economic opportunity, government performance, and civic engagement. It also devotes attention to "Digital Inclusion" including broadband availability, adoption, and utilization.²

Canada's vision appears more limited and strategic. Industry Canada has announced a Digital Economy strategy with a consultation paper entitled *Improving Canada's Digital Advantage: Strategies for Sustainable Prosperity*.³ Its main themes echo several in the US National Broadband Plan including innovation, building and extending "world-class" infrastructure, growing the ICT industry, and building digital skills.

US Infrastructure Initiatives

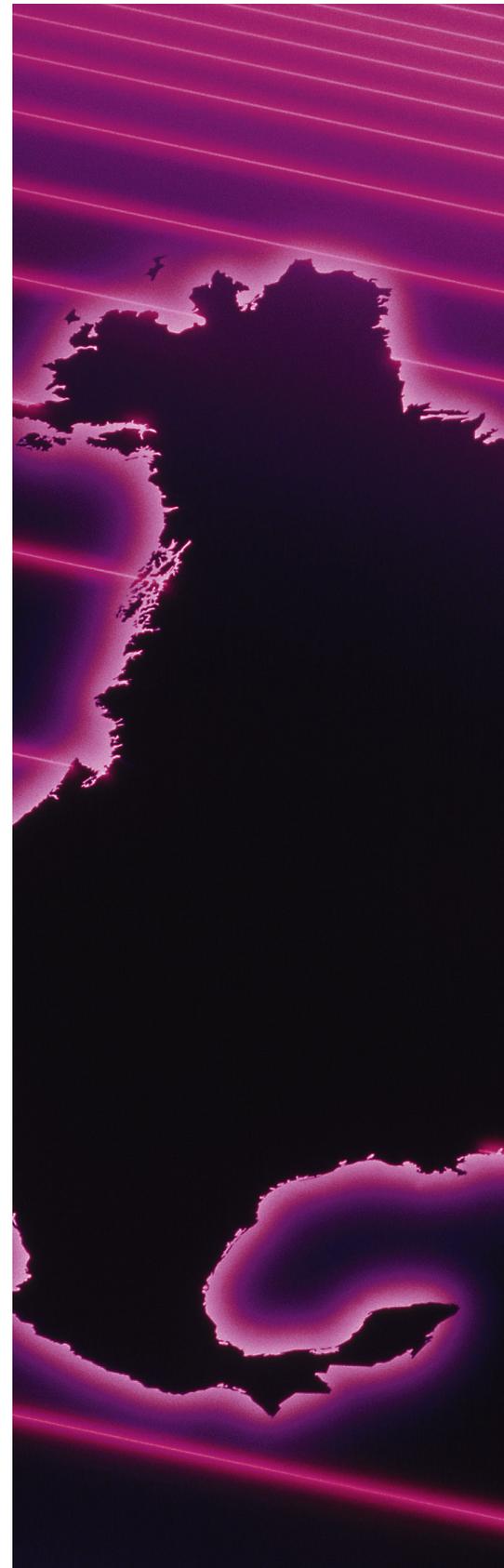
In the US, two federal agencies provide funding for rural telecommunications infrastructure. Based in the Department of Agriculture, the Rural Utilities Service (RUS) offers low-cost loans to extend and

upgrade the infrastructure of rural utilities. Initially, its loans were for voice communications in unserved areas; it now lends to rural providers to upgrade their networks for broadband, and also supports facilities for rural telemedicine and distance education.⁴ In the Department of Commerce, the National Telecommunications and Information Administration (NTIA) has administered several grant programs that include support for rural broadcasting and telecommunications.

In 2009, the *US American Recovery and Reinvestment Act* (Recovery Act or ARRA) appropriated USD7.2 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 USD2.5 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.⁵

Broadband Mapping

For several years, US 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 US. Accordingly, the Broadband Data Improvement Act (BDIA) mandated NTIA to improve data on the deployment and adoption of broadband service across the US,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 USD350 million to 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.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 was not available until 2011.⁹

Rural Utilities Service (RUS): Broadband Infrastructure Program (BIP)

The Recovery Act allocated USD2.5 billion for rural infrastructure projects to the RUS, which is administering these funds through the Broadband Infrastructure Program (BIP). Key elements 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 USD2.4 billion was made available, of which up to USD1.2 billion was for last mile projects. Of this funding, USD400 million was available for remote area projects, while the additional USD800 million could be used in remote or non-remote (but rural) areas. Up to USD800 million was available for middle mile projects. Unused funds in one category

could be allocated to another category. Up to USD325 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.¹⁰

As noted above, universal service fund reform is part of the process of implementing the US National Broadband Plan. The above features were retained in the FCC’s *Sixth Report and Order on Schools and Libraries Universal Service Support Mechanism* in September 2010.¹¹



NTIA: Broadband Telecommunications Opportunities Program (BTOP)

The Recovery Act allocated USD4.7 billion to NTIA for broadband mapping, and for the projects supported through the Broadband Telecommunications Opportunities Program (BTOP). As of the funding deadline (September 30, 2010), NTIA had funded 233 projects which would:

- » Fund the installation or upgrade of approximately 120,000 miles of broadband networks;
- » Provide broadband access to approximately 24,000 community anchor institutions;
- » Deploy middle mile infrastructure in areas with nearly 40

million households and 4 million businesses;

- » Invest in more than 3,500 new or upgraded public computer centers;
- » Invest in more than 35,000 new or upgraded public computer workstations.

NTIA estimated that their investments would make computer center workstations and training available to more than 1 million new users.¹²

Canadian Stimulus Initiatives: Broadband Canada: Connecting Rural Canadians

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 was provided to continue or replace BRAND. The government has subsidized satellite service for remote northern communities through its Northern Satellite Initiative, which continues through 2011.¹³

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 US.

In September 2009, Industry Canada announced *Connecting Rural Canadians*, a CAD225 million stimulus program to extend “essential infrastructure” in remote and rural areas.¹⁴ Like the US stimulus program, *Connecting Rural Canadians* was designed “to make broadband service available to as many unserved and underserved households as possible.”

While similar in intent, the Canadian program differed in being

exclusively rural and using a definition of broadband that is twice the speed 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 US 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 US includes loans.)

Policy and Regulatory Reform

The US National Broadband Plan

In March 2010, the FCC announced a National Broadband Plan. The plan's goals included *inter alia*:

- » At least 100 million US 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.¹⁵
- » 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).¹⁶

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:

- » 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 actual download speed. (Note that this is a different target from the national goal above of 100 Mbps.)
- » Create a *Health Care Infrastructure Fund* to support deployment of dedicated health care networks to underserved areas.
- » Create a *Mobility Fund* to upgrade wireless coverage throughout the country to 3G or better.
- » 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 below), 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".¹⁷

Canada's Digital Economy Strategy

Canada has no explicit national broadband policy or plan. However, in 2010, Industry Canada launched an online public consultation aimed at creating a digital economy strategy for Canada. It also published a consultation paper on *Improving Canada's Digital Advantage*.¹⁸

The emphasis is on using digital technologies as part of a Canadian strategy to build competitive advantage in ICT industries and digital media and content. There is little reference to specific sectors such as health, education, and public safety.

Sustainability through Universal Service Funds

US 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. Some principles proposed for the new Connect America Fund (CAF) include: "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"; "There should be at most one subsidized provider of broadband per geographic area"; "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". The National Broadband Plan concludes that private investment alone is unlikely to extend broadband in some areas of the country with low population density.¹⁹

The FCC first announced a *Notice of Inquiry and Notice of Proposed Rulemaking* on these universal service proposals on April 21, 2010.²⁰ Steps toward implementation are underway through a series of FCC Notices 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).
- » Subsidies for connectivity for rural health care (telemedicine and telehealth).

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.²¹ 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 D14-million-a-year program that would have halted 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). It then announced funding of CAD28 million to extend affordable access to the Internet to Canadians in schools, community centers and libraries. This was appar-



ently an interim strategy, as the Minister for Industry Canada noted: "We don't want to get anybody left in the lurch by having the funding cut this year, while the broadband strategy to households is still rolling out."²² However, the funding he refers to is for infrastructure (capex) and not ongoing operating subsidies (a contribution to opex).

In addition, the CRTC initiated a consultation in 2010 to review and update its basic service definition and support mechanisms.²³ The

CRTC's current 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.²⁴ 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. However, the CRTC in their recent decision (May 3, 2011) declined to include broadband as a basic service, but did set targets of 5 Mbps downstream and 1 mbps upstream actual speeds for all Canadians by 2015.³⁰

Subsidizing Users: Institutional Access

Some countries include support for institutions that make Internet services available to the public, such as post offices, libraries, and schools that extend access to the community.²⁵ 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 USD2.25 billion worth of discounts can be made available each year. Schools and libraries are responsible for the remainder, and must demonstrate that they can cover their portion of the costs.²⁶

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.²⁷

As noted above, universal service fund reform is part of the process of implementing the US National Broadband Plan. The key features of the E-rate were retained in the FCC's *Sixth Report and Order on Schools and Libraries Universal Service Support Mechanism* in September 2010.²⁸

Connectivity for rural health services is also supported from universal service funds in the US. 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.²⁹

Beyond Infrastructure: Lessons from North America

Access to broadband involves three critical components: availability, affordability, and sustainability. Broadband policies need to address all of these requirements. Stimulus projects and other initiatives to invest in infrastructure address only one element of access. Policymakers need to address sustainability requirements for rural and remote areas, and affordability for low income populations or high cost regions. The stimulus programs in the US 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 US 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 US 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,³⁰ but there are no individual or institutional subscriber subsidies for any services.

From Access to Adoption

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.³¹ Research is needed in each country or region to increase understanding of reasons for non-

adoption, to develop strategies to encourage adoption, and to identify or develop relevant applications for users with limited ICT or language skills.

Metrics and Mapping

It is important to have reliable and updatable data on location of facilities, actual connection speed, reliability, pricing and other relevant variables. In the US, the lack of comprehensive and granular data was the reason for the inclusion of funds for broadband mapping in the Recovery Act.

Ideally the maps would have been prepared before the funding process, and used to identify regions requiring support. Fairly detailed maps were already prepared in Canada before its stimulus funds were announced. In any jurisdiction the data should be regularly checked and updated, and GIS-bases created. Such maps can be combined with other data such as demographics, locations of schools, clinics, public safety facilities, etc.

Economic Impact

Stimulus projects are typically intended to create jobs quickly – and to support projects that are “shovel ready.” Yet these may be no more than short term jobs shoveling trenches for optical fiber or erecting towers for wireless coverage. Long term employment and economic impact requires more time, an understanding of the economic needs and goals of the country, and training to impart necessary ICT skills.

Context can be important: Canada's Digital Economy strategy focuses on perceived advantage in some sectors of the high tech industry and digital content. The US National Broadband Plan has a broader vision, and a specific mandate to tie in with other federal government

goals in improving efficiency and effectiveness of government services. Each country needs to determine how broadband investments could support its development goals.

Evaluation

Government investments in infrastructure and support for broadband services are based on the premise that use of broadband can contribute to goals such as social, cultural, and economic development, improved or extended delivery of public services, support for various sectors and other priorities.

Broadband infrastructure initiatives should therefore be evaluated not only to determine whether the funds resulted in the intended broadband deployment, but to assess impacts of increased access on availability and effectiveness of health services, education and training, government programs and services, new or increased economic activities, etc.

It is thus important to budget for evaluation of such initiatives including collection of baseline data before projects are implemented, collection of usage data, and collection and analysis of other data required to determine the impact of these investments. Neither the US nor Canada provided any funds for such research in their stimulus allocations. Yet without such research, governments and citizens will not know whether or how their investments contributed to local, regional, or national development.

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