*J*ournal of *R*ural and *C*ommunity *D*evelopment

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Citation:
Hudson, E., E. (2013). Beyond Infrastructure: Broadband for Development in Remote and Indigenous Regions. In W. Ashton & A. S. Carson (Eds.), [Special issue]. *The Journal of Rural and Community Development*, *8*(2), 44-61.

Publisher:
Rural Development Institute, Brandon University.

Editor:
Dr. Doug Ramsey

ISSN: 1712-8277 © Journal of Rural and Community Development
www.jrcd.ca

Beyond Infrastructure: Broadband for Development in Remote and Indigenous Regions

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Abstract

Recent telecommunications stimulus projects in the U.S. and Canada were intended to increase availability of broadband through funding infrastructure investments, largely in rural and remote regions. However, true access involves more than availability; it also includes affordability and adoption. This paper presents a framework for analyzing broadband adoption that takes into consideration geographical, economic and cultural environments in indigenous communities. It includes an overview of potential social and economic impacts of broadband in remote areas, using examples from the Alaska study and the Canadian North. It then reports on results of an evaluation of Internet use and potential adoption of broadband in remote indigenous communities of southwest Alaska. Finally, the paper provides a comparative analysis of U.S. and Canadian policies intended to achieve affordable access to broadband for rural users and sustainable business models for rural broadband providers.

Keywords: broadband, development, indigenous, telecommunications, Alaska, Canada, North

1.0 Introduction

Recent telecommunications stimulus projects in the U.S. and Canada were intended to increase access to broadband through funding infrastructure investments, largely in rural and remote regions. The rationale for these investments is that broadband will contribute to rural development including economic growth and/or diversification, and improved delivery of services, including education, health care, and other public services. However, understanding of the impact of broadband on development is still rudimentary. Also, true access involves more than availability; it also includes affordability and adoption.

This paper attempts to address the issues that lie beyond infrastructure by

addressing the following:

- Our current understanding of the role of broadband in development
- The elements of access
- A case study on Internet use and demand for broadband in remote Alaskan communities
- Policies to address rural access to broadband and sustainability.

2.0 The Benefits of Broadband

Researchers have taken several approaches to analyze the impact of telecommunications and more recently, broadband, on economic development. Macroeconomic studies have analyzed multiyear and multi-economy data sets, typically examining communications infrastructure investment and GDP growth or employment. Microeconomic studies at the firm level have examined broadband impact on productivity and growth in sales or revenues. Case studies have also examined impacts in various sectors or industries.

An example of the macroeconomic analysis approach is a recent World Bank econometric analysis of 120 countries that showed for every 10% increase in the penetration of broadband services, there is an increase of in 1.2% point increase in per capita GDP growth in high income economies, and 1.38% increase in developing countries (World Bank, 2009) (which are perhaps more comparable to some rural economies than the national economies of industrialized countries).

This research grew out of numerous studies on the role of telecommunications in socio-economic development beginning in the late 1970s (Hudson, 2006). In general, time-series analyses showed that while economic development contributed to telecommunications growth (countries with higher GDP had higher investments in telecommunications and other infrastructure), there was a small but significant contribution of telecommunications to economic development (investment in telecommunications led to higher GDP per capita). Numerous studies have also identified consumer surplus in the form of benefits to the customer not captured in GDP data such as transportation savings and access to entertainment and social services. These are typically measured as the difference between what users are willing to pay for broadband and prices of broadband services.

2.1 ICTs and Development

To determine what is behind these macroeconomic effects, it is necessary to understand how information and communication technologies (ICTs) including broadband can contribute to socio-economic development in general and rural development in particular.

According to Hudson (2006), benefits can be analyzed in terms of:

- *Efficiency*, such as saving time in managing operations of businesses, saving on travel, keeping track of inventory, etc.;
- *Effectiveness*, referring to the quality of services provided such as in health and education;

- *Equity*, reducing the distance barriers between rural and urban communities, and increasing access for minority, disabled, and disadvantaged populations; and
- *Reach*, providing access to new markets for local products, and potentially for local services such as telework.

For example, in Alaska, representatives of Native organizations, rural industries such as seafood processing, and rural tourism businesses in southwest Alaska all stated that broadband would make their work more efficient, saving them time in applying for grants and filing online reports and business data; keeping track of inventory, boats or aircraft; and managing their operations.

Effectiveness refers to the quality of services provided. In education, for example, online courses and other content can improve the quality of education available in small village schools. Remote students in Alaska taking university distance education courses say they need broadband to participate more effectively in the online activities and interaction. Use of telemedicine facilities improves the quality of village health care by making it possible for physicians at regional hospitals to diagnose and recommend treatment for village patients, and by allowing patient data and test results to be sent electronically.

Equity-related benefits in Alaska result from reducing the distance barriers between rural and urban communities by providing access to information, entertainment, education, shopping and other services that are not otherwise available in remote communities.

Reach refers to the ability of rural Alaskans to extend their markets electronically to market indigenous crafts, salmon and other wild products, wilderness recreation and tourism, and other local assets.

2.2 Sector Studies

Studies of the impact of broadband on various rural sectors can help shed light on these various benefits. A study by the U.S. Department of Agriculture on farm use of broadband states: "Farm operators may increasingly opt for distant suppliers to secure lower prices or better access to niche inputs. Suppliers with an established Internet presence …would appear better positioned to retain customers within the local economy." It also found that household characteristics such as age, education, presence of children, and household income are significant factors in adopting broadband Internet use. Generally, rural economies benefit from broadband availability: "…employment growth was higher and nonfarm private earnings greater in counties with a longer history of broadband availability (Stenberg et al., 2009, p. iii)."

Studies of *natural resource industries* such as mining, fisheries, forestry, and petroleum report that broadband can be used for logistics and back office management, training of workers, and, in some cases, supporting development of new markets or trading partners (see for example, Shideler, Badasyan, & Taylor, 2007). Concerning *e-governance* a study found that increasing the broadband network significantly reduces inefficiency in state economies (Thompson & Garbacz, 2008).

However, benefits remain elusive and often difficult to quantify. As Katz (2012) points out, the impact of broadband is neither automatic nor homogeneous across

the economic system. And Holt and Jamison conclude: "The lesson from the US appears to be that broadband has a positive economic impact, but that impact cannot be analyzed with any precision. (2009, p. 580)" They note that "One of the difficulties learned from studies of the effects of ICT is that impacts evolve.… (p. 580)"

2.3 Employment and Entrepreneurship

Concerning employment, Raul Katz notes that broadband can contribute to employment growth both as a result of infrastructure construction and spillover effects on the rest of the economy, particularly in sectors with high transaction costs such as financial services, education, and health care (2012). In California, Kolko also found that the relationship between broadband expansion and employment growth varies across industries, and that the positive relationship is especially large for utilities; information; finance and insurance; professional, scientific, and technical services; management of companies and enterprises; and administrative and business support services. He also noted that the relationship between broadband and employment growth is stronger in places with lower population density, "consistent with the theory that smaller or more isolated areas may benefit more from high-speed connections, giving businesses in these areas access to larger markets…. (2010, p. 24)"

In estimating jobs created by investment in broadband, some studies include construction and other technical jobs associated with infrastructure as well as other potential increases in employment. However, there may also be opportunities for entrepreneurs to provide services over the new networks. In Alaska, some native-owned telephone cooperatives provide local telephone services in Northwest Alaska (Kotzebue) and the Arctic Slope (Barrow).[1] At the moment, there are no indigenously-owned Internet service providers (ISPs) or other information technology services providers. Yet there are several examples of indigenous entities providing broadband capacity and services in Canada. Qiniq (meaning "to search") delivers broadband connectivity to 25 communities in Nunavut. Qiniq also provides local support, with each community having a community service provider, a local person who was trained to "install wireless modems, handle basic troubleshooting, and involve people in the initiative." Involving local people was seen as one of the key factors in achieving success (Qiniq, 2012).

Another network serving remote northern communities is K-Net (the Kuh-ke-nah Network), an aboriginal-owned community ICT network that provides access to the Internet to Cree and Ojibway communities in northern Ontario. It also contracts with health care providers to provide telehealth networks, and with the Ontario Ministry of Education to support an online high school (Keewaytinook Internet High School – KIHS) through which students in remote communities can obtain their high school diploma. K-Net also provides computer training and skills development for community members and community networking. In addition, K-

[1] For example, OTZ Telephone Cooperative in Kotzebue and Arctic Slope Telephone Association Cooperative (ASTAC) in Barrow.

Net manages a satellite-based network providing videoconferencing services to Native communities in northern Ontario, northern Quebec, and northern Manitoba. K-Net videoconferencing facilities are also used for social gatherings to link elders in remote Northwestern Ontario villages (see Fiser & Clement, 2009; www.knet.ca).

Another First Nations-owned communications operator is GwaiiTel, which makes high-speed Internet service available to residents of seven communities of Haida Gwaii. GwaiiTel was formed by the Gwaii Trust, a nonprofit organization established to enhance environmentally sustainable social and economic benefits to Haida Gwaii. Connection to the mainland is over North America's longest over-water radio link for Internet transmission. GwaiiTel invested more than C$1 million to build infrastructure connecting the islands' communities, with funding from the Gwaii Trust Society and a grant from Industry Canada's Broadband for Rural and Northern Development Pilot Program (BRAND) ("GwaiiTel Launches", 2006).

3.0 Access: Availability, Affordability, Adoption

Availability of telecommunications from the providers' perspective can be defined in terms of houses passed (for wireline technologies such as optical fiber, coaxial cable, and copper) and area covered for wireless technologies. Availability from the users' perspective requires a different lens. Data are typically reported by household: percentage of households with telephones, with broadband subscriptions, etc. Availability at local sites such as libraries, community centers, and schools is also an important indicator for rural and remote regions.

However, access involves more than availability; it also includes affordability and adoption.

The Federal Communications Commission (FCC) carried out a study in 2009 to examine broadband adoption and use; the top reason given by non-users for not using the Internet was affordability (Horrigan, 2009). The 2010 report *Exploring the Digital Nation* by the National Telecommunications and Information Administration (NTIA), states that "persons with low incomes, seniors, minorities, the less-educated, non-family households, and the nonemployed tend to lag behind other groups in home broadband use." It provides detailed analysis of broadband adoption gaps: for 26% of non-broadband users, the main reason for non-adoption was that home broadband Internet was too expensive. Among those who did not use the Internet at all, price and perceived relevance were cited as key considerations (Economics and Statistics Administration and the National Telecommunications and Information Administration, 2010; National Telecommunications and Information Administration, 2010).

While helpful in increasing our understanding of barriers to adoption among various groups including minorities, these studies do not have samples of Alaska Natives large enough to provide any valid findings. For example, the NTIA study states that 42.6% of American Indians/Alaska Natives used broadband at home, but there is no separate breakdown for Alaska Natives (National Telecommunications and Information Administration, 2010). Also, while NTIA data indicate that 70-76% of Alaskans use broadband, this estimate is likely to be highly skewed by the urban population (Economics and Statistics Administration

and the National Telecommunications and Information Administration, 2010). The FCC's recently released *Eighth Broadband Progress Report* estimates that 53% of Alaska Natives living in "village areas" do not have access to broadband (Federal Communications Commission, 2012). However, the metrics used in these studies may not be relevant for small Native communities where access may largely be at schools, libraries, community centers, or tribal/local government offices.

Because of the limitations of these national studies and the expansion of broadband to Southwest Alaska, it was very timely to undertake a case study of that region to understand how the Internet is currently being used, and possible demand and applications.

4.0 Alaska Case Study

Alaska is the largest state in the U.S. (at 1,530,693 square kilometers; it is about 1.4 times the size Ontario or three times the size of the Yukon), but with the nation's lowest population density, of only 1.2 persons per square mile (see Figures 1 and 2). Its total population is about 710,000, of which 14.8% are Alaska Natives.[2] Approximately two-thirds of the indigenous population live in more than 200 villages, most of which are remote settlements with fewer than 200 people. Since the late 1970s, all communities with at least 25 permanent residents have had telephone service (primarily by satellite), but broadband connectivity remains limited.

The concept of "rural" has a different connotation in Alaska than in many other regions; some 75% of Alaskan communities have no road access. Thus, extension of terrestrial broadband is challenging because of difficult terrain, permafrost, and reliance on boats, barges and particularly aircraft for equipment transport and access. As a step toward extending broadband to remote Alaska communities, TERRA-Southwest, an $88 million federal stimulus project funded by a combination of grants and loans from the Rural Utilities Service (RUS), will provide terrestrial broadband connectivity to 65 primarily Yupik communities in Southwest Alaska by the end of 2012 (see http://terra.gci.com) (see Figure 3).

4.1 Current Connectivity

Connection to the Internet in the region has been by satellite backhaul, with a variety of technologies linking users to local switches and satellite terminals. Some local companies offer DSL (digital subscriber line) service; cable modem service is available in only one location (Bethel). WiFi connects to satellite facilities in many villages. However, the throughput ranges only from dial-up (19.2 kbps) to 128 kbps or in some cases, 256 kbps. The limited transmission rates plus satellite latency make Internet service very slow for users. Some households and businesses have installed VSATs (very small aperture satellite terminals) with somewhat greater throughput, but not at rates that would be considered broadband.

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[2] 2010 census data for Alaska is available at http://live.laborstats.alaska.gov/cen/. An additional 51,875 identified themselves as racially composed of two or more races; a significant percentage of these are likely to be partly Alaska native.

Most of the communities now have cellular service, although coverage may be limited for people out on the land or on the water. Much of the region now has EDGE (2.5G) service, while some areas have only 2G GSM service.

Figure 1. Alaska and the Canadian North

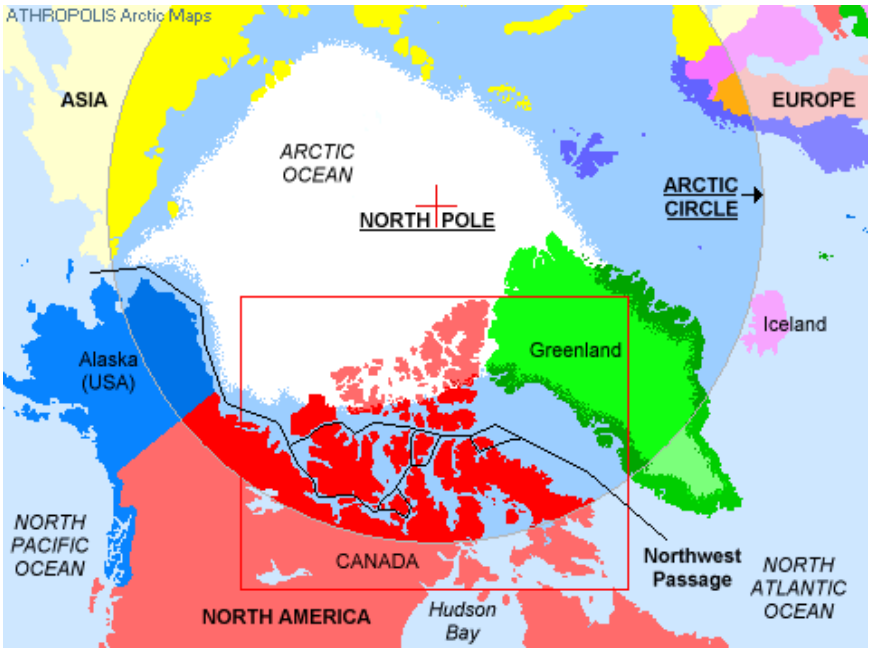


Figure 2. Alaska's size compared to the "lower 48" states

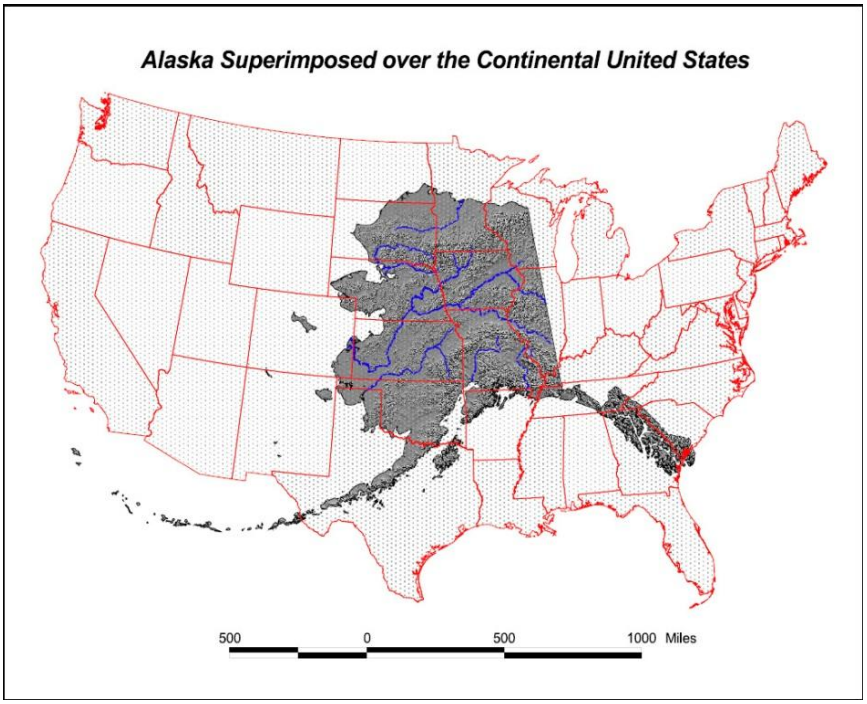
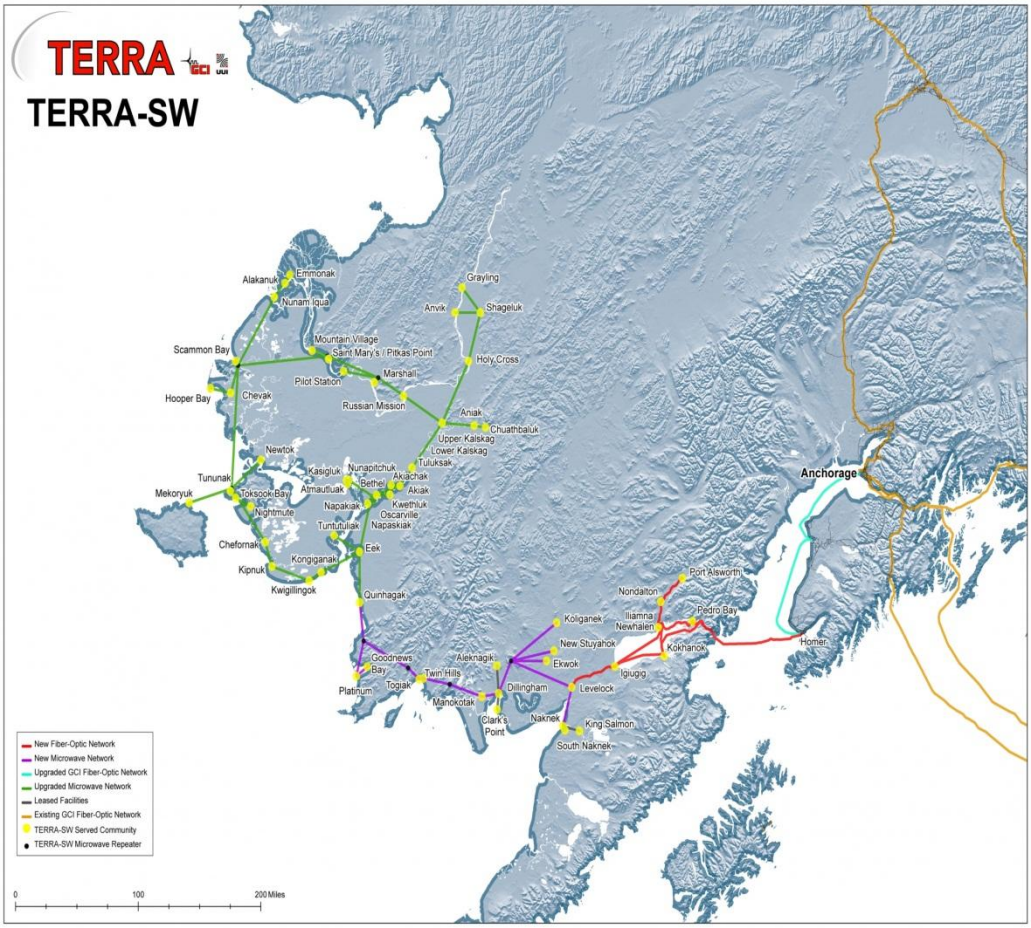


Figure 3. Southwest Alaska: TERRA Region (source: http://terra.gci.com/maps-locations)



4.2 Analytical Framework and Research Methodology

The following analytical framework for broadband adoption takes into consideration the geographical and cultural environments in indigenous communities of rural Alaska. Elements of the framework include:

- **Personal Use:**
  - Through smartphones or tablets, etc. that could access broadband using local WiFi networks or 2.5G mobile networks available in some communities.
- **Household Use:**
  - Members of a single household using facilities at home.
- **Community Use:**
  - Public use of broadband at community centers, libraries, tribal offices, or other publicly accessible locations.
- **Institutional Use:**
  - Use of broadband by employees or clients of organizations such as small businesses; major regional businesses such as fisheries, aviation, and

tourism; Native corporations and nonprofit organizations; tribal councils, etc.

A random telephone survey of 340 households was carried out in the 65 remote communities to be served by the TERRA project in southwest Alaska in late 2012.

4.3 Demographics

Household income varies substantially throughout the region, with the highest household income in the Bristol Bay Borough, and lowest in two inland census areas, one of which has the lowest per capita income in the State.[3] Commercial fishing is the major industry in the Bristol Bay Borough, while subsistence fishing and hunting are mainstays of the local economy in most villages. As reflected in the income disparities, employment opportunities vary greatly within the region. The fewest unemployed are in the Bristol Bay Borough where the primary economic activity is commercial fishing – with only a 4.1% unemployment rate in May 2012, while 21.5% were unemployed in the Alaska Native villages in the Wade Hampton Census Area and 14.9% in villages in the Yukon-Koyukuk Census area.

Approximately 70% of those interviewed identified themselves as Alaska Natives, while 25% stated they were white or Caucasian, and 5% were other racial categories. About 54% of respondents spoke a Native language at home, with the highest percentage (60 to 78%) in the villages. An additional 3% spoke another language at home in addition to English.

4.4 Summary of Findings[4]

Internet use is already quite widespread in remote communities, and two-thirds of users are online almost every day. Thus, many people in the region are already "Internet-savvy", but most are dissatisfied with slow speeds and uneven quality of service, and would like faster and more reliable connections.

Community access is important for Internet users, including those with home subscriptions. Outside the home, they access the Internet at work and at school, and also at libraries and tribal offices. About 60% think members of their household access broadband elsewhere in the community, even if they subscribe at home.

There is definitely *enthusiasm about broadband* – only 8% think their households definitely won't subscribe (this is considerably fewer than among rural residents

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[3] Because of its low cash income and relatively young population, the Wade Hampton Census Area has the lowest per capita income ($11,269) in the state ("U.S. Census Bureau. *American Community Survey, 2006-2010"*, cited in Alaska Economic Trends, 2012).

[4] For a detailed analysis of these findings see Hudson, Heather E. (2012) "Internet and Broadband Adoption in Indigenous Communities: An Analysis of Rural Alaska." Paper presented at the Telecommunications Policy Research Conference, Washington, DC, September 2012.

across the country). About 45% think their households would definitely sign up for broadband. The remainder who aren't sure are primarily concerned about cost – monthly subscription and overages or other charges.

Concerning likely *uses of broadband*, personal communications and entertainment ranked highest (social networking, downloading music and video, playing online games). However, 48% said they expected to use broadband for education, 45% said they would use Skype or similar services for video conferencing, and 39% said they would use broadband for work or telecommuting. The interest in education and telecommuting indicate that broadband could help residents upgrade their education and work from their homes or communities.

Other services that residents thought they would use include online banking, reservation services, and online shopping.

Educational use of broadband from home is likely to increase, as more schools provide laptops to students. To derive maximum benefit from the laptops (or tablets) students need to be able to access the Internet from home, where laptops can also be shared with other family members.

Cellphone penetration is high, with 87% of households having at least one cellphone and 60% of households having a smartphone. Primary use is for voice and text, but many also use their mobile phones to access the Internet for social networking, browsing the web, and sending and receiving photos, etc. However, bandwidth and speed are limited for these applications. Some residents take their smartphones to school where they can use the WiFi connection. More than 50% also have an iPad or other tablet, or e-reader. There will thus clearly be demand for *mobile broadband*.

The need for digital literacy training among people with limited experience in using the Internet, the generally widespread use of computers and other devices, and upgrades in connectivity all indicate a need *for local employees with IT skills*. These IT workers could provide training as well as technical support in each community.

In many locations, more than one-third of households have their own VSATs (except in Bethel, where cable and DSL access are available). Those households with satellite service may indicate how *early adopters* of broadband may use the service, as they have chosen to upgrade to higher speed Internet service than is currently available from local carriers. Some 88% of satellite users accessed government services online, 87% accessed financial services, while 68 percent used the Internet for education, and 62% for work or telecommuting. These early adopters of the fastest connections available provide some indication that future broadband users will take advantage of broadband for work, education, and public and private sector services not available in their communities.

4.5 Education and Health Services

The study did not include data collection on educational institutions (schools and community colleges, etc.) or health services, as substantial information is available from other sources. However, these sectors will continue to be major users of connectivity. By law, any community with at least 10 students must have a school providing instruction for kindergarten through grade 12. Small schools may have

only two teachers for multiple grades, so that online materials can be very useful to enrich the curriculum, and online high school courses can allow students to take courses in advanced subjects and electives that would not be offered locally. Continuing education for teachers, health aides, and public safety workers is also available online. Increasingly, schools are providing laptops or tablets for students to use in class and take home, where it is expected that they and family members can access the Internet.

Alaska has been a pioneer in rural telemedicine, dating from experiments with NASA (National Aeronautics and Space Administration) satellites in the 1970s. Previously, village health aides had relied on two-way radio for a daily "radio call" with doctors at regional hospitals and to reach hospitals in an emergency. The radio system was notoriously unreliable in much of remote Alaska, and in some cases, radios were only in teachers' homes and not at the clinic. The experiments on NASA satellites showed that reliable voice communication between health aides and doctors could improve diagnosis and treatment of village patients, and generally resulted in fewer patient evacuations (Hudson & Parker, 1973). The AFHCAN (Alaska Federal Health Care Access Network) was established in the 1990s to provide greater support to village health aides by adding a terminal in each clinic with a computer and peripheral equipment such as an electronic otoscope, EKG monitor, and digital camera. Today, Alaska remains a global leader in telemedicine, with 248 sites and more than 33,000 cases per year. Research by the Alaska Native Tribal Health Consortium (ANTHC) has documented travel savings of over $2.85 million dollars for Medicaid from 2003 to 2009, so that for every $1 spent by Medicaid on reimbursement, $10.54 was saved on travel costs (Ferguson & Kokesh, 2011).

4.6 What Difference May Broadband Make in Rural Alaska?

Since broadband is just being introduced in southwest Alaska, the study can only suggest what its future impacts may be. One indication is from respondents who stated how they may use broadband. Personal connections and entertainment ranked highest (social networking, downloading music and video, playing online games). However, as noted above, 48% said they expected to use broadband for education, 45% said they would use Skype or similar services for video conferencing, and 39% said they would use broadband for work or telecommuting. The interest in education and telecommuting indicate that broadband could help residents upgrade their education and work from their homes or communities.

Another indication of potential uses of broadband is the experience from current satellite service subscribers, who have chosen to upgrade to higher speed Internet service than is currently available from local carriers. These "early adopters" of the fastest connections available provide some indication that future broadband users will take advantage of broadband for work, education, and public and private sector services not available in their communities.

Some respondents said they would benefit from online banking and reservation services.

Some thought that online shopping would allow them to buy cheaper goods than were available locally, but that there could be a negative impact on local stores.

Respondents from Native organizations commented that broadband could save them time in accessing online information and software compared to time required using current Internet services, and would be beneficial in applying for grants and filing reports with funders, and helping tribal members applying for jobs. Some also noted opportunities to offer training in villages, and to help local entrepreneurs develop websites to sell crafts and other products.

The tourism industry also requires reliable communications to support their operations and build their businesses. Fishing lodges and other wilderness tourism businesses rely on telephone and email to respond to potential customers, and websites and travel agencies to attract business. Similarly, businesses in hub communities use online services to attract customers and manage their operations.

The seafood processing industry would definitely benefit from faster connectivity to run their back office operations, such as uploading catch information, payroll and other accounting data, and using other software for their business. They also represent a source of many new customers in the thousands of seasonal workers they hire for up to four months who want to use the Internet to keep in touch with family and friends and to access entertainment. Broadband wireless connectivity to boats and processing vessels in Bristol Bay would be used both to keep crews up to date on operations, as well as to provide personal broadband access for crews and seasonal employees. These applications for logistics and back-office communications as well as for personal use by employees are also likely to apply to the mining and petroleum industries.

However, as discussed above, reliable communications remain necessary but not sufficient for rural economic development. As one respondent put it: "I think right now there are a lot of other important factors that could improve our economy … such as access to property and making inexpensive loans available for residents."

4.7 Estimating Benefits for Alaska

Estimating the value of benefits of broadband investment in Alaska was beyond the scope of the current research. However, it would be possible to estimate the number of individual and institutional beneficiaries including:

- Education: total number of rural students and rural teachers
- Health care: total number of rural health aides
- Public safety: total number of Village Public Safety Officers (VPSOs), etc.
- Native organizations: Native corporations, village corporations, Tribal councils, Native nonprofits, etc.
- Resource industries: seafood processing companies, mining companies, oil and gas companies, etc.
- Tourism: ecotourism, tour operators, lodges, etc.
- Other rural businesses: estimates of number of businesses from state data.

For workers in these sectors, their jobs may be enhanced and skills improved by access to broadband. For many of these entities, economic benefits may be cost savings in terms of increased efficiency or travel substitution. For others, there

may be increased revenue and possibly new jobs such as from more grant funding received by Native organizations, more business for tour operators and lodges, etc.

New jobs that could result from broadband availability could include:

- IT workers/trainers in each community;
- Self-employed entrepreneurs who could sell crafts, other products online;
- New types of jobs such as environmental monitoring;
- Possibly new jobs such as telework to do back office data entry or customer support, etc.

Benefits in terms of upgrading skills and accessing services such as banking and online shopping that would improve quality of life and save money or increase income could potentially accrue to all adult rural residents.

It is also important to note that while the rural Alaska population is relatively small, it is also young. For example, in Southwest Alaska, the median age in census areas ranges from 22.5 years to 27.5 years. Rural Alaska youth will grow up using computers and mobile phones, but will also need job opportunities if they are to remain in their communities as adults.

5.0 Policies to Address Access and Sustainability

Sustainability for providers and affordability for users can be addressed through universal service policies. In Alaska, as in other rural regions, they may be considered two sides of the same coin. Without federal subsidies, Alaska's vastness and low population density could make telecommunications prohibitively costly for rural residents and unattractive for private sector investment.

5.1 Universal Service Funds

Several Universal Service Fund (USF) components provide additional revenue to service providers and subsidize services for users:

- *The High Cost Fund:* subsidizes telecommunications carriers to provide voice services to rural and isolated populations;
- *E-Rate*: A subsidy for Internet connectivity (and some equipment) for schools and libraries;
- *Rural Health Care:* A subsidy for connectivity for rural health facilities;
- *Low Income Subscribers:* Lifeline and Linkup programs subsidize voice services and installation of telephone lines for low income residents (Hudson, 2009).

Alaska has been a major beneficiary of the federal USF programs, both in absolute funding and in funding per capita. Typically, Alaska's schools and libraries qualify for subsidies ranging from 70% to 90% of the charges for connectivity. From 1998 through 2011, Alaska received more than $211 million from the E-Rate program,

among the top states in per capita support in the country.[5] The subsidies for rural health care pay the difference between the costs of connectivity in rural areas and the major city in a state; for Alaska, this is Anchorage. In 2011, Alaska received more than $44.7 million, more than 53 percent of the total amount allocated by the fund.[6]

The FCC has begun reviewing universal service support programs as a key strategy to implement its National Broadband Plan, and intends to replace some existing support funds with a Connect America Fund (CAF) that emphasizes support for broadband. It has also raised questions of whether Lifeline subsidies for low income households should be extended to broadband, and whether universal service funds should be used for digital literacy. All of these issues may affect future broadband adoption and sustainability for residents of rural Alaska and other tribal and remote regions.

5.2 Initiatives to Increase Indigenous Access and Participation

As part of its strategies to implement the National Broadband Plan, the FCC has proposed new policies and regulations designed to expand broadband and to engage native organizations on tribal lands and in remote regions. New initiatives include:

- Creation of an Office of Native Affairs and Policy (ONAP) to promote deployment and adoption of communications services throughout tribal lands and native communities;
- Establishment by ONAP of a Native American Broadband Task Force;
- Requirement for Eligible Telecommunications Carriers (ETCs) receiving USF support to demonstrate that they have "meaningfully engaged" Tribal governments in their supported areas;
- A Broadband Lifeline pilot program to determine whether the Lifeline program can be extended to broadband, in order to increase the adoption and retention of broadband by low-income households;
- Special allocation under the CAF Mobility Fund of $50 million capital plus up to $100 million/year for tribal areas;
- Remote Areas Fund of $100 million per year (most Alaska Native communities would meet the "remote areas" criteria).

These are not only new initiatives, but some of them are without precedent. For example, the author knows of no other regulator in the world that has required carriers to consult with indigenous representatives in order to receive subsidies for serving their communities. However, implementation of such initiatives requires much more than regulations or funding set-asides. Tribal governments and other

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[5] Derived from data available at www.usac.org.

[6] Derived from data available at www.usac.org.

entities must be aware of the new opportunities and have the requisite understanding of policy, technology and FCC procedures to be able to participate. Tribal entities that are interested in providing communications services must meet requirements for ETC certification. Existing carriers must evaluate incentives to apply for new funding programs to serve regions where long-term commercial viability appears unlikely.

5.3 Canadian Targets for Rural Broadband

In Canada, there is no national broadband plan, although there is some subsidy for carriers serving high cost regions. However, in 2011, the Canadian Radio-Television and Telecommunications Commission (CRTC) stated that broadband users should be able to "stream higher-quality audio and video and to participate in video conferencing at reasonable quality using online services. This capability will enable users to engage in such activities as participating in distance learning and online consultations with professionals (basic e-health)." To accommodate such uses, the CRTC set a target for broadband access of a minimum of 5 Mbps download and 1 Mbps upload. The CRTC noted that "while many Canadians in urban areas already have access to broadband Internet services at or above these target speeds, such speeds are not currently available to most Canadians in rural and remote areas." It also stated that target speeds are to be actual speeds delivered, not merely those advertised. It expects that "the target speeds set out above will be available to all Canadian homes, regardless of their geographic location, through a range of technologies" by the end of 2015 (CRTC, 2011).

As in the U.S., awareness will be necessary if this policy is to succeed so that users can monitor compliance. However, enforcement will also be required to ensure that providers meet these speed targets – and provide adequate quality of service. And it appears that Canada does not have any permanent policies in place to address the need for affordability for users and sustainability for providers.

6.0 Implications for Other Remote and Indigenous Regions

Insights gained in Alaska may be relevant for other remote areas and regions with indigenous populations. Many indigenous residents already use the Internet at home or elsewhere in the community, and are strongly interested in broadband. However, affordability remains a major concern. Also a majority of those who intend to subscribe say that they will continue to use broadband connections elsewhere in the community – at school, work, library, or tribal/community center – even if they subscribe at home. These conditions are also likely to be common in other remote regions.

Equipment and skills are of concern to Alaska Natives in the villages that tend to have less education and lower cash incomes than residents in regional centers. Therefore, digital literacy training, IT support, and "infomediaries" to help users track down required information and services are likely to be important to facilitate adoption.

While entertainment is a driver of Internet adoption and interest in broadband, there is significant interest in educational applications, access to government information, and teleworking. Again, training and efforts to use broadband as part

of overall economic development strategies for the region may be necessary to optimize benefits from broadband.

As is true in many other regions, mobile phone use is now very widespread, and mobile subscribers want to be able to access the Internet and other broadband services on their phones and on other portable devices. Planners and policy makers need to consider mobile as well as fixed infrastructure in plans for universal broadband in remote and indigenous regions.

However, capital investments in infrastructure do not guarantee sustainability in many remote and indigenous regions. Policies are required to encourage maximum adoption and constructive utilization of broadband and to ensure ongoing sustainability. For policies to be effective, users and providers need to be aware of opportunities and motivated to take advantage of them, and regulations must be enforceable.

Based on research to date, it would appear that many applications of broadband by rural residents, social services, non-profit organizations, and commercial enterprises can contribute to economic growth and diversification, and to improved delivery of services and access to educational resources in remote communities. But many other factors such as digital literacy, relevant content, and opportunities to generate income are likely to be required if these benefits are to be realized; as with other forms of telecommunications, broadband may be *necessary but not sufficient* for rural development.

7.0 References

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