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Internet and Broadband Adoption in Indigenous Communities: An Analysis of Rural Alaska

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Internet and Broadband Adoption in Indigenous Communities: An Analysis of Rural Alaska¹

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Abstract:

Alaska is the largest state in the U.S., but with the nation's lowest population density of only 1.2 persons per square mile. About 15 percent of the population are Alaska Natives. Approximately two-thirds of this indigenous population live in more than 200 villages, most of which are remote settlements without road access.

A current broadband infrastructure project in rural southwest Alaska provides an opportunity to gather reliable data on rural broadband adoption and use, and perceived barriers to adoption among Alaska Natives.

This paper presents an analytical framework for broadband adoption that takes into consideration the geographical and cultural environments in indigenous communities of rural Alaska. It then reports on results of an evaluation of Internet use and potential adoption and impacts of broadband in southwest Alaska. The first phase of the evaluation included a telephone survey of approximately 400 households of the region to gain information on current ownership of ICTs and Internet use. Interviews were also conducted with key informants from Native corporations and tribal organizations, economic development organizations, local businesses, and major sources of income such as fisheries, social services, and tourism to provide insights on potential benefits of broadband for rural development.

1. Background

Alaska is the largest state in the U.S. (571,951 square miles or more than twice the size of Texas), but with the nation's lowest population density, of only 1.2 persons per square mile. Its total population is about 710,000, of which 14.8 percent are Alaska Natives.¹ Approximately two-thirds of the indigenous population lives in more than 200 villages, most of which are remote settlements with fewer than 200 people. Since the late 1970's, 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 percent 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. However, TERRA-Southwest, an

¹ Support for this research came from Connect Alaska with funding from the National Telecommunications and Information Administration (NTIA) for the work of the State of Alaska Broadband Task Force.

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\$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 the Bristol Bay and Yukon-Kuskokwim regions later this year.²

The State of Alaska, through its designee Connect Alaska, also received federal stimulus funding from the National Telecommunications and Information Administration (NTIA) for tasks including support for an Alaska Broadband Task Force “to both formalize a strategic broadband plan for the state of Alaska and coordinate broadband activities across relevant agencies and organizations.”³

Several recent studies have examined broadband adoption and reasons for nonadoption among U.S. residents, with some data disaggregated by various demographic and ethnic criteria (age, education level, urban/rural, gender, ethnicity, etc.) 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.⁴ 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 percent 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.^{5 6}

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 percent of American Indians/Alaska Natives used broadband at home, but there is no separate breakdown for Alaska Natives.⁷ The FCC report also states that the sample of Alaska Natives is too small to report results.⁸ Within that category, it is also important to disaggregate Alaska Natives by urban and rural, as broadband availability is very limited in rural Alaskan communities, which are primarily inhabited by Alaska Natives. Thus, while NTIA data indicate that 70 to 76 percent of Alaskans use broadband, this estimate is likely to be highly skewed by the urban population.⁹

Connect Alaska has conducted some broadband usage surveys, but it does not appear that their sample is adequate to identify usage and perceived needs of people in remote communities, particularly Alaska Natives.¹⁰ Also, the metrics used in these studies may not be relevant for small Native communities where access may largely be at schools, libraries (where they exist), community centers, or tribal/local government offices.

Thus, a study of the impact of the TERRA project in southwest Alaska is both relevant and timely. This first phase can provide baseline data on current access to and use of ICTs and Internet connectivity in rural Alaska, and some insights about perceived benefits and potential barriers to adoption of broadband. It can also provide guidance to the State Broadband Task Force in determining how the extension of broadband throughout the State could contribute to education, social services, and economic activities that would enhance Alaska’s future. Results

of the research could also be used proactively to develop strategies to encourage broadband adoption, and to identify applications and support needed by users with limited ICT skills.

2. 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; 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 with somewhat greater throughput, but not at rates that would be considered broadband.

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.

3. Analytical Framework and Research Methodology

We propose an analytical framework for broadband adoption that 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 that may be 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.

To gather information on these various categories of users and usage, two major forms of data collection were adopted:

- Telephone interviews with a random sample of residential telephone subscribers in TERRA communities;
- Telephone interviews with key informants such as Tribal leaders, managers of local businesses, managers of Native corporations and nonprofit organizations.

There are approximately 9700 households in the TERRA-Southwest communities. A random sample was drawn from both landline and mobile phone numbers assigned to residents of the region; cellphone numbers were included because many residents now rely on cell phones as

their primary means of voice communications. A total of 352 interviews were completed, with screening to assure that there were no duplicate respondents from the same household. Delays in obtaining funding resulted in interviewing during June and early July when some residents were involved with commercial or subsistence fishing; as a result, the sample included more residents with post-secondary education, and slightly more respondents from larger communities than would be expected from a random sample. The responses were therefore weighted to represent the demographics of the region.

The instrument included several questions used in the U.S. Census Bureau's Current Population Survey (2011) in order to compare results from this study from those reported in the NTIA's *Digital Nation* reports. Some questions were also drawn from the OECD's latest ICT user survey.¹¹

Indicators used in developing interview protocols and questionnaires include:

- Availability of mobile phones
- Uses of mobile phones
- Availability of Internet at home
- Means of accessing the Internet
- Current monthly charge for Internet at home
- Use of Internet elsewhere in community
- Internet applications
- Reasons for not subscribing to Internet
- Intent to subscribe to broadband
- Intended uses of broadband
- Reasons may/will not subscribe to broadband
- Sources of information for community and region
- Sources of information for state and outside Alaska

4. Demographics

Household income varies substantially throughout the region, with the highest household income in the Bristol Bay Borough, and lowest in the Wade Hampton and Yukon-Kuskokwim Census Areas. 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. 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.¹²

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 percent unemployment rate in May 2012, while 21.5 percent were unemployed in the villages in the Wade Hampton Census Area and 14.9 percent in villages in the Yukon-Koyukuk Census area.

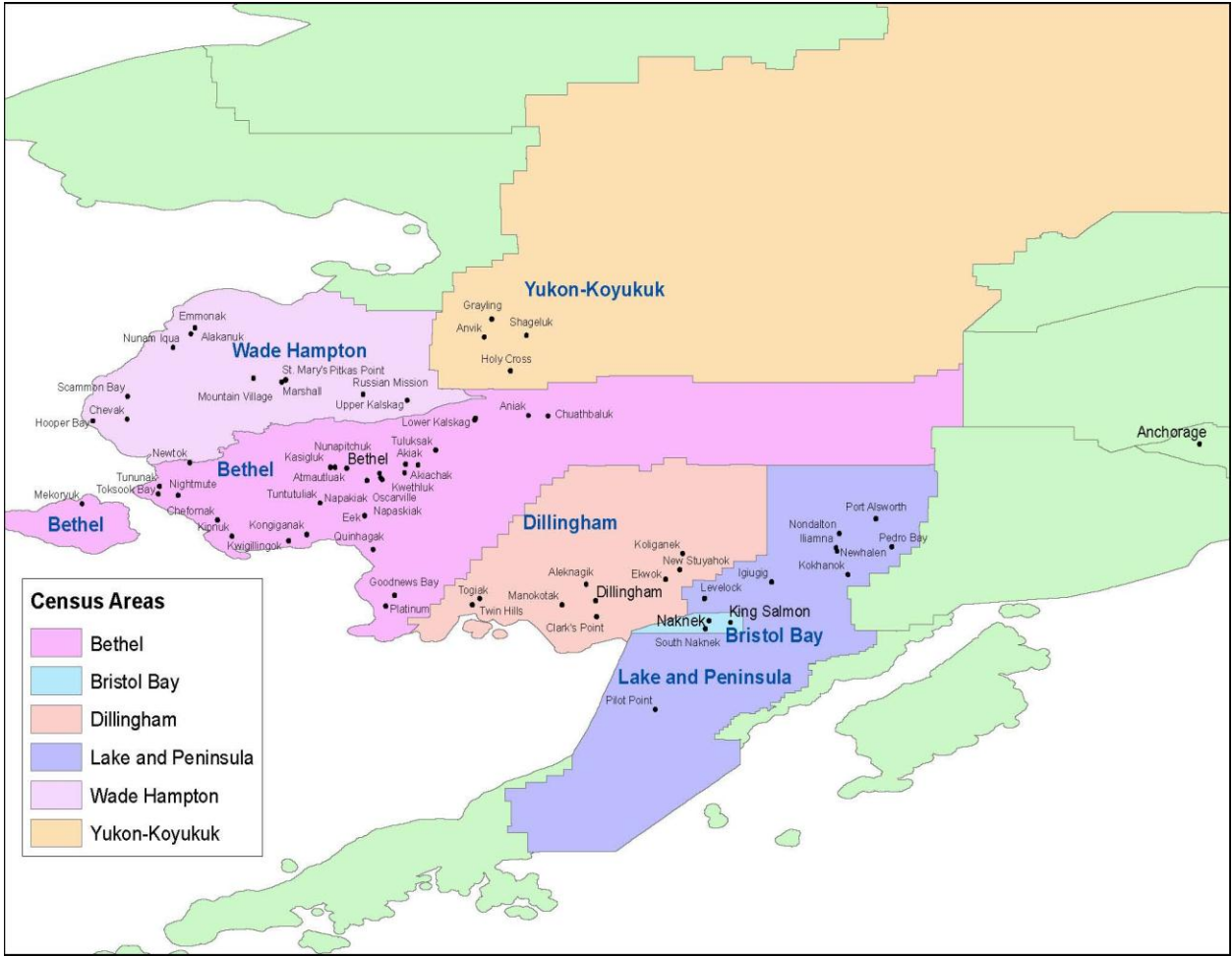


Figure 1: TERRA Region with Census Areas

Table 1: Income and Household Size¹³

District	Median Household Income	Average Household Size
Bristol Bay Borough	\$84,000	2.56
Dillingham Census Area	\$60,800	3.42
Bethel Census Area	\$52,214	2.66
Lake and Peninsula Borough	\$40,909	3.30
Wade Hampton Census Area	\$37,955	4.28
Yukon-Koyukuk Census Area	\$33,712	2.61
Alaska	\$ 66,521	2.68

Table 2: Unemployment Rate: May 2012¹⁴

Bristol Bay Borough	4.1%
Lake and Peninsula Borough	8.0
Dillingham Census Area	10.2
Bethel Census Area	15.4
Yukon-Kuskokwim Census Area	14.9
Wade Hampton Census Area	21.5
Alaska average	7.3%

In the broadband study, 48 percent of the respondents were working full time (as employees or self-employed), 40 percent were working part time or seasonally employed, and 22 percent did not currently have paid employment. The number of respondents who were not employed was highest in the villages (28 percent).

Respondents were not asked to state how much they earn, but only about education and employment, which tend to be highly inter-correlated, and generally correlated with income.

Ethnicity and Languages:

Approximately 70 percent of those interviewed identified themselves as Alaska Natives, while 25 percent stated they were white or Caucasian, and 5 percent were other racial categories.

About 54 percent of respondents spoke a Native language at home, with the highest percentage (60 to 78 percent) in the villages. An additional 3 percent spoke another language at home in addition to English.

Education:

The percentage of respondents in the survey with more than high school education was somewhat higher than the overall regional average. The highest percentage of college-educated were in the towns, while high school completion was the most common level in villages.

As noted above, part of the explanation for higher education levels and more respondents with jobs is likely the timing of the survey – during fishing season, where people involved in both commercial and subsistence fishing were more likely to be away from their homes.

Table 3: Education Levels:

Less than high school:	7 %
Completed high school	45
Some college (includes vocational)	27
4-year college degree or higher	22

5. Mobile Phones: Access and Use

Respondents were asked about cellphone ownership and use because mobile devices can be an important means of accessing and sharing information, and smartphones may become an increasingly important means of accessing the Internet.

Cellphone penetration was very high throughout the region, with an average of 83 percent of households having at least one cellphone. Access was high in all subregions, with the highest being in interior villages (88 percent). Of these, a high percentage were “smartphones”, i.e. i-phone, Android phone, or Blackberry.

Just 10 percent of mobile phone users said they used the phone only for voice calls. The most popular application after voice was texting, with 83 percent saying they use their phones to receive or send text messages (which would not require additional bandwidth). However, half the respondents with cellphones said they use their phones to browse the web, and more than 40 percent listed other applications, most of which would require smartphones and at least 2.5G service.

Table 4: Respondents’ Uses of Mobile Phones in Addition to Voice Calls:

Sending or receiving text messages	83%
Taking photos or videos	62
Browsing the web	51
Listening to music or other audio	49
Playing games	47
Accessing social network sites	44
Downloading apps	41
Sharing photos or videos	41

There was little variation in most popular uses across the region, although respondents in Bethel and Dillingham and doing the interview on mobile phones were more likely to use their phones for e-mail than other respondents (48 to 54 percent). Some 30 to 35 percent of respondents in Bethel, Dillingham, and those who responded on mobile phones used them for mapping or GPS navigation.

The high penetration of smartphones and major uses for services other than voice and text indicate that mobile devices are likely to be an important means of accessing broadband services in the region.

6. Access to the Internet

A total of 61.3 percent of respondents had Internet service at home, with the highest penetration in the towns: 80 percent of more in Bethel, Dillingham, and Bristol Bay Borough, and lowest in the villages, with less than 50 percent of households having Internet service.

Table 5: Have Internet Service at Home

Bethel	87.5%
Bristol Bay Borough	84.2
Dillingham	80.0
Villages: Dillingham, Lake&Pen Borough	49.7
Villages: Bethel/Wade Hampton/YK	43.2

Connecting to the Internet:

Generally, those who had Internet at home used whatever technology was available locally to connect: DSL, cable modem in Bethel, and terrestrial wireless. However, satellite service (via VSAT) was the most common means of accessing the Internet in Bristol Bay and Dillingham regions (more than 40 percent of subscribers), and for more than 30 percent of village subscribers. The only region with very low satellite use was Bethel (2.4 percent of subscribers), which has both cable and DSL service.

Some 8.9 percent of those with Internet at home subscribed to dial-up service, with the highest percentage being in the Bristol Bay Borough and Bethel/Wade Hampton/UK Census villages.

Internet Access at Other Places:

At least two-thirds of respondents said that someone in their household accessed the Internet from another location in the community. The most popular locations were the workplace and schools. The workplace was the most common among those in Dillingham, Bethel and the Bristol Bay Borough, while schools were most popular in the villages.

More than 40 percent said they accessed the Internet at someone else's house. Other locations were libraries (more than 40 percent of those in towns), while the tribal office was a popular access point in villages. About a quarter of household members in Bristol Bay and Dillingham used Internet cafes or WiFi hotspots.

7. Internet Usage

Ownership of Devices

Of those households with Internet connections, more than 80 percent have a laptop computer, while more than 60 percent have a desktop computer, and virtually all of them are used for Internet access. Some 60 percent also have smartphones, and more than 90 percent of those also are connected to the Internet. Many households also own other electronic devices such as game systems, tablets and i-pods (MP3 players), and most of these are used to connect to the Internet as well.

Table 6: Ownership of Devices among Internet Subscribers

Device	Ownership	Percent who use device to connect to Internet
Laptop computer	83.1 %	97.1%
Desktop computer/PC	64.2	98.1
Game system (Wii, Xbox, Playstation)	59.5	58.8
Smartphone	59.3	93.0
Tablet, i-pad, e-book reader	56.4	86.2
I-pod, I-pod touch*	40.6	100.0
Netbook	13.9	98.4

Frequency of use:

Some two-thirds of Internet users in the TERRA region are on online every day or almost every day.

Table 7: How often do people in your household use the Internet?

Every day or almost every day	67%
At least once a week	13%
At least once a month	5%
Less than once a month	7%
(No response	7%)

Internet Applications:

The most popular use of the Internet was for e-mail, followed closely by general searches for information and social networking. Online shopping is very popular (74 percent of households), likely because choice of goods in small communities is very limited, and postal rates are inexpensive. Some 60 percent said their households used the Internet for online banking and for accessing government services. These applications are significant because villages have no banking services, and many government forms and other information are available online. Most communities would not have any local access to these government services. Another important application is for education and training, with 54 percent of households using the Internet for education-related tasks such as school projects or online classes. Library resources are extremely limited in villages.

Table 8: Respondents Reporting Someone in their Household uses Internet for:

E-mail	82%
Finding information such as news, weather, sports	79
Social networking such as Facebook, Twitter	78

Online shopping	74
Download and/or stream music or videos	62
Online banking or other financial services	61
Accessing government services, forms, information	61
Uploading content such as photos or videos	59
Education or training, school research, online class	54
Maps, GPS	43
Look for jobs	43
Work from home/telecommute	37
Healthcare information or appointments	32
Internet phone or videoconferencing, e.g. Skype	28
Sell goods or services online	23
Gaming	4
Chatting online	1

8. Considerations about Internet Service

The most important considerations about Internet service were: reliability of connection (91.5 percent), connection speed (89.7 percent), and price (81.9 percent). These three factors were consistently ranked highest in all subregions. Some users also specifically expressed concern about data usage limits, which could be considered an element of price. Two other factors – ability to get online outside your house, and a specific provider – were considered important by a smaller number of respondents, 57.9 percent and 41.8 percent respectively.

Price of Internet Access:

Internet users paid a wide range of charges for monthly Internet access, from less than \$20 per month (apparently for dial-up service) to more than \$100 per month. Some 29 percent of respondents with Internet service said they paid more than \$100 per month, with the highest number paying more than \$100 per month in Bethel (47.6 percent of subscribers) and Dillingham (37.5 percent).

Reasons for Not Having Internet Service:

Among those who do not subscribe to the Internet at home, the most important factor listed in all regions was cost. Additional factors cited were concerns about privacy, availability of Internet elsewhere in the community, and reliability and availability of Internet service.

Table 9: Reasons for not subscribing to Internet service

Cost of Internet service	67%
Concerns about privacy	52%
Can use Internet elsewhere	49%
Internet not reliable	43%
Internet not available	43%

Of those citing cost as a concern, the monthly cost of Internet service was by far the most important, cited by 88 percent.

Table 10: Most important costs of Internet service among nonsubscribers

Cost of monthly Internet service	88%
Cost of installation	57
Cost of computer or other equipment	52

Privacy Concerns:

Privacy remains an important issues for ICT users in southwest Alaska. Compared to providing personal information over the telephone, 40 percent said they were more concerned when using the Internet, while 48 percent were equally concerned about providing personal information on the phone or online.

9. Interest in Broadband

Intent to Subscribe at Home:

About 44% of respondents thought their households would sign up for broadband, while an equal number (45%) said they weren't sure, or "it depends...." Among those who said "it depends," their primary concern was cost (56 percent).

Intent to Use Broadband elsewhere in the Community:

Almost 60 percent of respondents said they thought they would use broadband somewhere else in the community when it was available, with the highest percentage (68 percent) from the villages in the Dillingham, Lake and Peninsula Boroughs region. This projection points to the need for community access to broadband through schools, libraries, and/or other locations.

Issues that Impact Decision to Subscribe:

About 8 percent thought their households definitely would not sign up for broadband. Those with less than high school education were more likely than others to say that they definitely would not sign up for broadband. Among those who thought their households might not or definitely would not sign up for broadband, price was their overwhelming concern, cited by 72 percent. Only 15 percent of those who thought they would not sign up said their households did not want it or see a need for it, although this percentage was higher (23 percent) in villages, which typically had lower education levels.

The concerns about equipment and skills were higher in villages, with 41 percent in villages saying that they did not have necessary equipment such as computers, and 16 percent

saying they did not know how to use the Internet. These responses point to the need for digital literacy training, and for ongoing community access.

Table 11: Reasons may/will not sign up for Broadband

Price/cannot afford it	72%
Do not have equipment	26
Do not want/see need	15
Privacy concerns	14
Do not know how to use it	10
Worried about content	10

Broadband Applications:

Respondents were asked to identify broadband services they thought they or other household members would likely use. The top services listed were social networking, downloading music, downloading TV/videos/movies, and school or other education like online classes. Several of these are similar to services that Internet users stated they do already, although likely much more slowly. However, playing online games and Internet telephony and video calling are services that few use now.

Table 12: How Household Members may use Broadband

Social networking	59%
Downloading music	57
Downloading video/TV/movies	54
School or other education	48
Playing online games	45
Video calls or conferencing, e.g. Skype	45
Work or telecommuting	39

10. Sources of News

For comparison with NTIA studies, respondents were also asked about their sources of news. After pretesting, the topic was divided into two questions: news about their community and region, and news about the rest of Alaska and outside Alaska.

Personal communications and mass media remain important sources of information for TERRA region residents. The most cited source of news about their communities and the region was talking with friends/family/coworkers, followed by reading local newspapers/magazines, and listening to the radio. These responses show the ongoing importance of the “moccasin telegraph” to share local and regional information, and the role of local newspapers and community/regional radio stations.

Most important sources of news for news about the rest of Alaska and Outside were TV (68 percent) and the Internet (47 percent), followed by radio and print media. This ranking of sources more closely mirrored national responses.

Table 13: How do you get News:

	About Community and Region	About rest of Alaska and Outside
Talking with friends/family/coworkers	58%	20%
Reading newspapers or magazines	53	28
From the radio	52	29
From TV	46	68
From the Internet	38	47

11. Summary of Findings

Mobile Use and Demand: Mobile phone use is very widespread. Besides voice calls, the most popular use of cellphones is for texting (which requires very little bandwidth). However, many residents now own smartphones that provide some Internet access over 2.5 G networks or WiFi, and are eager to get Internet access on these and other mobile devices.

Internet Use: Many Southwest Alaska residents including village residents already use the Internet either at home or at work or school. Two-thirds of those who access the Internet are online every day or almost every day.

Internet Applications: While applications for social networking entertainment are very popular, the Internet is also used extensively for education (schoolwork or distance education), online shopping, and accessing government forms and services. Respondents indicate that the connections are too slow for some online course requirements, and that users sometimes have difficulty downloading forms or using other online services.

Interest in Broadband: About 45 percent of residents interviewed said their households would definitely subscribe to broadband service. Only 8 percent thought they definitely would not. The remainder said “maybe” or “it depends...” Price was their primary concern.

Cost: Internet subscriptions can require a significant commitment of disposable income in regions where unemployment is high and much paid work is seasonal. Among those who do not subscribe to the Internet, the most cited reason was monthly subscription cost. Monthly cost is also the key concern among those who are not sure or not likely to subscribe to broadband.

Community Access: Residents of towns are more likely to have Internet service at home than those in villages, but use of the Internet outside the home is widespread, most commonly at schools or at work, also at libraries and Tribal offices. Many of those with Internet service at

home also go online elsewhere in the community, and 60 percent think they will use broadband outside the home. Concerns about price of monthly service also indicate that availability of broadband at schools, libraries, or other community locations will be important to ensure access.

Digital Literacy: Some residents, particularly in villages, state that they do not have the necessary equipment or skills to use broadband. Thus, digital literacy training and technical support will likely be necessary if rural Alaskans, particularly those living in remote villages, are to benefit from broadband.

IT Employment: Concerns among both residents and organizations serving villages about need for digital literacy training and technical support indicate that there will be a need for more technical support workers, particularly in villages.

Productivity: Commercial businesses and nonprofit organizations all stated that broadband would be very beneficial in improving their productivity.

Funding and Jobs: Regional nonprofit organizations and Tribal councils said that broadband would help them to access funding and training opportunities that are otherwise not available. Such opportunities could enable them to expand their services and hire additional employees.

Seasonal Employment: Seafood processors and tourist lodges are major employers of seasonal workers who would use broadband to stay in touch with family and friends, and for entertainment. Costs of access would be paid either by the employer or by individual employees.

Regional Information: Interpersonal communications (the moccasin telegraph), local papers, and radio remain the most important sources of local and regional news.

Comparison with National Studies: While rural Alaskans are quite similar to other Americans in their current use of the Internet and aspirations for broadband, there are some important differences. A higher percentage intend to sign up for broadband than in other rural regions. However, price is a more dominant concern among rural Alaskans. More rural Alaskans access the Internet and plan to access broadband elsewhere in their community, even if they subscribe at home.

12. 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, 48 percent said they expected to use broadband for education, 45 percent said they would use Skype or similar services for video conferencing, and 39 percent 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. Some 88 percent of satellite users accessed government services online, 87 percent accessed financial services, while 68 percent used the Internet for education, and 62 percent 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.

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 that would lose business once people knew online ordering was cheaper and reliable.

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, reliable communications remain necessary but not sufficient for rural economic development. As one respondent put it: “I think right now they're a lot of other important factors that could improve our economy ... such as access to property and making inexpensive loans available for residents.”

13. Implications for Other Remote and Indigenous Regions

While the results of this study are specific to Southwest Alaska, many of the insights gained 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. Pricing may place subscriptions and home usage beyond the means of villagers dependent on subsistence fishing and hunting rather than cash incomes. Also a majority of those who intend to use broadband 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, who 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.

Finally, 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.

NOTES

¹ 2010 census data for Alaska 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.

² See www.terra.gci.com.

³ <http://www2.ntia.doc.gov/grantee/connected-nation-alaska>.

⁴ Horrigan, John. "Broadband Adoption and Use in America." *The FCC Omnibus Broadband Initiative (OBI) Working Paper Series*. Washington, DC: Federal Communications Commission, 2009.

⁵ National Telecommunications and Information Administration. *Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access*. Washington, DC, February 2010.

⁶ Economics and Statistics Administration and the National Telecommunications and Information Administration, *Exploring the Digital Nation: Home Broadband Internet Adoption in the United States*. Washington, DC:, November 2010.

⁷ National Telecommunications and Information Administration. *Digital Nation: 21st Century America's Progress Toward Universal Broadband Internet Access*. Washington, DC, February 2010.

⁸ "For Asian-Americans, American Indians, and Alaskan natives, the sample yielded fewer than 100 respondents in each group. The first two groups in particular have a sizable population that may not speak English or that have low telephone penetration rates. Because of that and the small sample of respondents, it is inadvisable to report results" Quoted in Horrigan, John. "Broadband Adoption and Use in America." *The FCC Omnibus Broadband Initiative (OBI) Working Paper Series*. Washington, DC: Federal Communications Commission, 2009, p. 14.

⁹ Economics and Statistics Administration and the National Telecommunications and Information Administration, *Exploring the Digital Nation: Home Broadband Internet Adoption in the United States*. Washington, DC:, November 2010.

¹⁰ See <http://www.connectak.org/research/residential-survey-methodology>.

¹¹ OECD. "European Union survey on ICT usage in households and by individuals 2012." Eurostat Model Questionnaire (version 3.2)

¹² Source: U.S. Census Bureau, American Community Survey, 2006-2010, reported in Alaska Economic Trends, August 2012, vol. 32, no. 8, August 2012.

¹³ *Alaska Economic Trends*, vol. 32, no. 8, August 2012.

¹⁴ *Alaska Economic Trends*, vol. 32, no. 8, August 2012.