# *Furthering the Diffusion and Absorption of the Internet in Rural Alaska*

Prepared For
The Alaska Science and Technology Foundation
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## Table of Contents

# I. Introduction

The Alaska Science and Technology Foundation (ASTF) has requested a report providing analysis and recommendations for improvements in the following three areas:

1. Forms and costs of providing Internet capabilities to villages.

2. Expanding the range of uses and the size of the user community within each village.

3. Professional development of teachers, "bright kids," and others at the village level.

While the ASTF is interested in all three problems, it desired the focus to be on the final one. To that end, we have given particular attention to identifying and training one or two well-motivated individuals from each village to ultimately serve as resident "Village Information Expeditors" (VIEs). [1]

We flew into eleven Alaskan rural communities[2] and Old Crow, Yukon Territory in order to obtain "on the ground" information with respect to what was actually happening with the Internet in rural ("Bush") Alaska.[3] There was, of course, a fair amount of diversity in terms of the availability, cost, absorption and use patterns, but overall there were a number of consistent themes that emerged. First, there is great interest in and desire to utilize the Internet in rural Alaska[4], but second, with the exception of highly restricted government subsidized access, the costs and quality of Internet access are currently major impediments to realizing the potential of the Internet there.[5] Third, the level of locally available Internet expertise is spotty at best, and generally is good only through the happenstance that an individual with both the interest and ability takes it upon himself to add this service to what is usually an already heavy load. Fourth, due to these circumstances, individuals in the villages are often left to fend for themselves and the people there face a steep learning curve; progress is often slow or reaches a quick ceiling.

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[1] This is a tentative title. We are open to other suggestions.

[2] McGrath, Bethel, Kasigluk, Russian Mission, Anvik, Galena, Huslia, Kobuk, Bettles, Beaver and Ft. Yukon.

[3] Knowledgeable people around the state were also interviewed, such as Nan Thompson, chair of the Alaska Regulatory Commission, Lt. Governor Fran Ulmer, AT&T Alascom and GCI officials, Della Mathis, the state's E-Rate coordinator, and many others.

4 "The Internet puts the whole world at our hands." Catherine Attla, Huslia, Alaska, May 27, 2000. Here and in similar citations, we refer to oral personal communications with the authors.

5 This problem is well known and efforts are currently underway to address it, including by U.S. Sen. Stevens.

Thus, the not surprising conclusion for Problem 1 is a discussion of how it might be possible to get decent bandwidth at affordable prices to all rural residents. Problem 2 turns out to be dependent on both Problems 1 and 3. In order to expand the user base, we feel it is necessary to have both affordable bandwidth available to the public at large (Problem 1) and to make Internet expertise available locally in the villages (Problem 3). In recommending an aggressive and demanding training program for "Village Information Expeditors," in addition to being necessary to accomplish the goal of Problem 2, we are trying to give some of the best and brightest a local outlet and value for their professional development.

## II. Forms and costs of providing Internet capabilities to villages

### (A) Service to the villages

The lucky villages that are close enough to be served by microwaves from hub communities, such as Kasigluk from Bethel, may already be able to obtain affordable dial-up Internet service. Residents of Kasigluk can currently obtain unlimited Internet access for $155 per year ($12.95/month), albeit speeds are in the 14.4–19.6 Kbps (kilobits per second) range. In contrast, for the residents of Russian Mission, which is not very far from Kasigluk, dial-up access involves an interstate long distance call on a 7 cents per minute Costco calling card. The call is interstate because it is cheaper than an intrastate call. In both cases, however, as is true in virtually every village in the state, reasonably good Internet bandwidth (56 to 128 Kbps), is being provided to the schools, 90% of the cost of which is borne by the Universal Service Fund (USF) "E-Rate" federal subsidy. However, under the current E-Rate interpretation, only use of this bandwidth on school or library property is allowed.

While many schools are allowing some community use on site, it is very limited, and generally not available during weekends, evenings, and particularly, the summer when most of the schools are closed. This "stove piping" thus leaves the bulk of most communities without convenient or, in some cases, any effective Internet access. This leads to the anomaly that Alaskan students are encouraged to learn the Internet in school, but once having graduated, are no longer allowed to use it unless they leave the village. The net result has been the establishment of a new digital divide within each village—one that separates students and government people from parents, senior citizens, and almost everyone else.

The restrictive interpretation of allowable E-rate uses is not universally shared. Alaska Lt. Governor Ulmer has recently written to the FCC that neither the Telecommunications Act of 1996, nor the FCC rules support this restrictive interpretation.[6]

A similar USF program for rural health care is also in the process of being implemented in Alaska. For example, the Yukon Kuskokwim Health Corporation (YKHC) informed us

[6] Alaska Lt. Governor Ulmer e-mail attachment of August 9, 2000.

that they were moving ahead under this program to bring T-1 level of 1.544 megabits per second (Mbps) Internet connections into 13 villages and then redistribute this among other villages via a terrestrial wireless infrastructure.[7] This will allow "telemedicine" including video consults.

It is understood that restrictions for community use similar to those for the Schools and Libraries program will be applicable to the Health Care Provider subsidy. The result is that the federal government is paying most of the cost for two separate relatively high speed Internet connections. Both of these may be up to 90% underutilized over the course of their annual availability, but they can not be used by the other members of the community who have no viable or affordable route to the Internet.

In addition to these two routes into a village, the Department of Interior, *via* its "DoINet" provides an 800 number dial-up login to Recognized Tribal Organizations, which is currently only available 13 hours a day. This, however, is a long distance call that can be used by only one person and usually with a very poor connection speed. Other federal and state agencies may also have their own Internet connections.

GCI indicates that it can provide a 128 Kbps satellite link for $2,700. However, a school customer told us that such a link costs closer to $3,800. The same school customer indicated that the 56 Kbps link they had previously gotten from AT&T Alascom was costing $3,200 per month. GCI has provided the following information regarding their charges[8]:

*Approximate GCI per month Pricing (3 yr. contract)*

| Bandwidth | Internet Connection | Satellite Line | Total |
|---|---|---|---|
| 56 Kbps | $ 198 | $ 1,380 | $ 1,578 |
| 128 Kbps | $ 399 | $ 1,840 | $ 2,239 |
| 256 Kbps | $ 790 | $ 2,944 | $ 3,734 |
| 512 Kbps | $ 1,584 | $ 4,876 | $ 6,460 |
| 768 Kbps | $ 2,376 | $ 6,624 | $ 9,000 |
| 1.544 Mbps | $ 4,700 | $ 12,880 | $ 17,580 |

[7] Rebecca Grandusky, Chief Information Officer, Yukon-Kuskokwim Health Corporation, May 25, 2000.

8 The apparent discrepancy between the $2,239 price for 128 Kbps is, according to a GCI representative, due to the cost of the client router and proxy, web and e-mail server in the school.

AT&T Alascom provided the following information:

*Approximate AT& T Alascom Pricing (3 yr contract)*

| Bandwidth | Internet Connection | Satellite Line | Total |
|---|---|---|---|
| 56 Kbps | $ 536 | $ 1,458 | $ 1,994 |
| 128 Kbps | $ 644 | $ 1,813 | $ 2,457 |
| 256 Kbps | $ 806 | $ 2,934 | $ 3,740 |
| 512 Kbps | $ 1,123 | $ 4,833 | $ 5,956 |
| 768 Kbps | $ 1,174 | $ 5,589 | $ 6,763 |
| 1.544 Mbps | $ 1,346 | $ 13,045 | $ 14,391 |

Two other companies, Microcom and AlaskaSAT are looking at providing additional satellite service to the Bush. Microcom, an Alaska distributor of home satellite products and services, such as the DISH direct satellite TV broadcast system, is planning to offer a direct to home satellite Internet service called Gilat-To-Home in November, 2000.[9] The cost for a 400 Kbps downlink/70 Kbps uplink is $69.50 per month with equipment costs running about $1,100 to $1,300, depending on the size of the antenna required.[10] AlaskaSat, is in discussions with ViaSat, a satellite company, regarding providing another satellite option. As of this writing, they are still working on pricing, but believe through metering (paying for bandwidth used) and scalability (only using the bandwidth needed), they can substantially reduce prices from the current satellite providers.[11] Another company, WorldProNet, has also indicated interest in providing dial-up service to a number of villages. A review of the communities proposed to be served reveals that they are ones that do not require direct satellite service to obtain connections to the Internet and thus this approach does not appear to help much. WorldProNet has not responded to our inquiries and thus our information is second hand.

The Denali Commission has contracted with the McDowell Group to provide a comprehensive (316 rural villages or communities) telecommunications survey, including the availability, cost and service provider of Internet service. Originally scheduled for release at the end of July 2000, the report has been delayed until at least September.

McGrath Light & Power (ML&P), a subsidiary of MTNT, Ltd., the merger of the McGrath, Takotna, Nikolai and Telida Native village corporations, is perhaps the only independent ISP that takes a direct 256 Kbps satellite feed that costs $2,600 per month and distributes Internet service inside the village. ML&P offers wireless connectivity within McGrath for $32 per month and dial-up access for $42.50 per month. The reason

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[9] The Gilat-to-Home network has reportedly leased 140 mbps of transponder space for all of North America, which covers Alaska. [Tom Brady, August 31, 2000]

[10] Traditionally, satellite based home systems have suffered from the requirement that the outgoing traffic (uplink) be sent through a dial-up telephone connection. Gilat-to-Home purports to have eliminated this problem.

[11] Devery Price of AlaskaSAT, August 24, 2000.

the wireless access is less expensive than dial-up is that the $35/month fee for each telephone line used to support the modem pool is eliminated.[12] The flip side is that the equipment to connect wirelessly currently costs some $675. With 50-60 accounts, including business accounts, ML&P is approaching breakeven. McGrath now has a majority of the households connected so there is very little residential growth potential. Ernie Baumgartner, the General Manager of ML &P reports that if ML&P could get the state or federal agencies to use his service, it would become economically viable. Another interesting experience in McGrath is that a wireless Internet customer who is too far out for regular phone service uses the Internet's Voice Over Internet Protocol (Internet telephone call) to make both local and long distance calls. There is a 2 cents per minute charge to use the VOIP software, but it only costs the 2 cents for long distance calls. MTNT has been repeatedly asked to expand into other villages, but its CEO, Carl Propes, is concerned that, without a major partner, anything they do could be squashed by the entry of any major player.[13]

**(B) Service inside the village**

Dial Up. Once the Internet connection has been established to the village, the question becomes how to distribute it inside the village. Standard dial-up service is, of course, the most obvious way of providing service to residences, businesses, and agencies in the villages. However, in some villages, the quality of the phone lines is so poor as to support only very low connection speeds. In fact, at least one report was of a connection speed of only 100 bits per second, which is approaching ancient telegraph transmission speed. However, even in many of the villages where the phone system is adequate, local dial-up ISP service has not become generally available. This is presumably because of the high cost to the ISP to connect to the Internet.

DSL. It has been reported that at least some of the local exchanges are considering rolling out DSL service at rates comparable to those in the cities. However, this may spawn a challenge in the Regulatory Commission of Alaska on the basis that the Local Exchange Carriers are using a non-competitive, subsidized service to subsidize a competitive service.[14]

Wireless. Wireless Local Loop infrastructure is an entirely viable approach to many if not almost all villages in Alaska. Under current technology, for as little as a $10,000 investment, a 2-5 mile radius can be covered with an 11 Mbps (shared) signal. Currently it costs about $700 for the equipment for a single computer to access this signal and

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12 ML&P reports that it needs one modem for every three dial-up accounts to keep the busy signals to an acceptable level.

13 Carl Propes, August 25, 2000.

14 Tom Brady, President, Alaska Satellite Network, August 31, 2000.

$3,000 for a network of computers. This has already happened in at least two communities, Toksook Bay[15] and McGrath, and others are considering it.

Cable Television. Anchorage, Fairbanks, Juneau and maybe others of the larger communities offer broadband (asymmetric) Internet service through existing cable TV distribution systems. This is also a possibility in the villages, most of which have a cable television system.

Electrical Distribution System. It is now possible to carry Internet traffic over electrical distribution systems and it has been suggested that this is a possibility in village Alaska. It remains to be seen, however, whether the electrical generation and distribution systems are "clean" or reliable enough to offer the service[16] and whether the amount of investment required is economic.

Direct Satellite Broadcast. If the Gilat-to-Home or similar direct-to-customer-premises satellite service becomes a reality, this has real potential in the villages. And, if as reported, [17] Gilat is looking at redistributing its satellite feed inside communities, the economics of being a local ISP has gone from being mostly a non-starter to completely viable.

### (C) Recommendations

We have the following recommendations regarding forms and costs of Internet access

#### a) Support the deployment of local Internet Service Providers

A local Point of Presence (POP) which essentially means a place to connect to the Internet, can offer both dial-up and higher speed options. This seems very desirable. Among the possibilities for higher speed service, as described above, are (1) Wireless, (2) Cable Modem, (3) DSL. and (4) Electric Distribution Lines. Wireless is probably the least expensive and most readily and easily implemented. The VIE (described in section IV) could potentially also be the ISP or the ISP's employee.

#### b) Leverage E-Rate and other subsidies

Currently the Federal Government and the state pay, or soon will pay, for up to five different high-cost Internet connections into a community. These include: (1) E-Rate Schools and Libraries, (2) E-Rate Rural Health, (3) The Federal Telecommunications System (FTS) 2001 contract, (4) state telecommunications system, and (5) DoINet for

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[15] There were some reports that the schools and libraries E-Rate connection was being redistributed in Toksook Bay in violation of the E-Rate rules and may have been shut down.

[16] Of course, all Internet connectivity relies upon the availability of electrical power and whenever a village's electrical system goes down, so will all of its Internet access not on backup power.

[17] Tom Brady, President, Alaska Satellite Network, September 5, 2000.

Recognized Tribal Organizations. Each of these may be as much as 90% underutilized and they all prohibit general public use, even when there are no viable, affordable alternatives. The obvious solution is to open up the federally subsidized connections to general public use when no reasonable cost alternative exists. However, it is more complicated than that because, as indicated above, there are potentially a number of efforts underway to provide much lower cost service to rural Alaska. To the extent that E-rate and other subsidies are used to provide community-wide service, none of these alternatives will have much of a chance of coming to fruition, and, incidentally, possibly lower the costs of the subsidies as well. One thing to consider, however, is to attempt to eliminate the requirement that an E-rate provider be a "common carrier" because it substantially raises the entry cost for these new technologies to provide USF service. If the carrier requirement was eliminated, the cost of the service might decline substantially.

**c) Leverage State telecommunications services**

The State could consider how its purchase of telecommunications services might be leveraged to provide affordable community access. One way is to sell some of the bandwidth to local ISPs and another is to purchase bandwidth from a local ISP so as to provide the critical revenue that makes it economically viable.

**d) Encourage additional satellite service**

As indicated, at least two companies are contemplating satellite service to Alaska and one, Gilat-to-Home, may be just a few months away from providing such service. It is hard to escape the conclusion that rates for satellite service would decrease if additional competition occurred.

**e) Provide "local" 800 number access**

A number of countries in the world, including Turkey and perhaps up to 15 sub-Saharan African countries, are working on special area codes for Internet use. Anybody with a computer and modem in any part of the country can dial a special area code number and connect to the net for the cost of a local call. The Department of the Interior's service to Recognized Tribal Organizations does this for specific entities. Perhaps this is something that can be explored. Unfortunately, if line quality is poor, the connection speeds will not be very good.

Internet access to rural Alaska has come a long way in a fairly short time for the schools and health clinics. To date, this has left the rest of the village out, creating an "Intra-Village Digital Divide," but there is hope that this may also change soon. Until it does, however, the full promise of the Internet will not be realized for rural Alaska.

## III. Expanding the range of uses and the size of the user community within each village.

As previously noted, the two most important things for expanding the range of uses and size of the user community within each village are (a) solving the problem of affordable

Internet access as described in section II, above, and (b) providing local Internet technical resources described in section IV, below. In other words, adequate access at a reasonable price is a necessary predicate to expanded use of the Internet. This is demonstrated by the E-rate program itself. The ability of the schools to obtain connectivity at an affordable cost exploded the use of the Internet inside the schools. Similarly, the range of uses and size of the user community will not increase substantially until affordable Internet access is available.

Just as there will be no substantial expansion in the size of the user community without adequate connections at a reasonable cost, there will be very slow expansion of the uses of the Internet without the local availability of support services. Of particular value, in our view, is a resident "Internet Guru" if you will, or "Village Information Expeditor" to assist people in moving up the learning curve. This will be discussed next.

## IV. Professional development of teachers, "bright kids," and others at the village level.

### (A) Problem to be solved/needs to be met.

Problem: A great deal of attention and effort is being given to getting the Internet to isolated, rural Alaskan villages. From what we were able to see, many people are not getting access or, if they are, for the most part their use is expensive and very limited both quantitatively and qualitatively. The Internet user interfaces are still complicated, frustrating, and formidable for many people. Few places have knowledgeable people who can and do help others beyond the most elementary uses. We have seen members of the communities, especially more senior citizens, struggling to work their way up the learning curve. Not every town has a local "guru," and many of the local experts either do not share their knowledge, or this knowledge is not much beyond that of the other users.

This problem exists all over the world. It is so widespread that it is called the "village digital divide." However, the people in Alaskan villages have advantages over almost everyone else who lives in one of the millions of poor, isolated villages around the world. These advantages include:

- High levels of literacy;
- English as a native language;
- Significant amounts of disposable income in a currency that is readily accepted anyplace in the world;
- Existing access to electric power and basic telecommunications;
- State and Federal governments that have shown particular interest in the well being of native peoples;

- State and Federal governments that can afford to partially subsidize a population that makes up a very small fraction of the total population.

If villages can be "wired" anywhere, it should be here.

Needed: Ways to increase the size and sophistication of the user community within each village, and ways to accelerate and sustain these communities along the learning curve.

**(B) Basic description of the educational program**

As a means to at least partially solve this problem, we would suggest setting up a demanding, focused program to educate some of the best and the brightest people from the villages to effectively serve as resident "Village Information Expediters" (VIEs). In various capacities suitable to the circumstances of each village, the VIEs would serve their communities by helping others to appreciate the benefits they might derive from use of the Internet and related information technologies, and to provide the detailed assistance necessary for them to pursue these benefits.

The program would be made up of a short, formal course and a longer term sustained virtual support community made up of the course's alumni, instructors, and others with an interest in furthering the goals of the program and bridging the Alaskan village digital divide. The course would consist of two parts: an intensive full-time traditional face-to-face segment of 2-3 weeks duration, and a distance learning portion of 9-12 weeks. The course instructor would manage the virtual support community, and all successful graduates would be encouraged to participate. It would be a vehicle for continued learning and technology transfer in a very dynamic area, and for sharing and resolving problems.

If all goes well, as the "cadre" of VIE reaches a critical mass where almost every village has one, the course would either become obsolete or would be absorbed into the regular curriculum of a university or offered via an industry association. The virtual support community would hopefully prove so useful that it would be continued in a self-sustaining way, perhaps by an "alumni" group.

**(C) What would be expected (hoped for) from its graduates?**

An intent of the proposed VIE educational program is to provide a village with a resident who is much more knowledgeable about the Internet and what might be done with it than is now normally the case. It is most important that this person be a member of the community and be willing and able to share that knowledge with many other members.[18] The VIE should help to establish and sustain the Internet as part of the community infrastructure, i.e., as a resource that may be used for many purposes by anyone in the village, and for a modest cost.

[18] We have no objection to travelling Internet minstrels or missionaries, but feel very strongly about the need for a permanent resident of the community for this role.

To this end, some of the possibilities would be for the VIE to:

1. Set up a place for public access to the Internet. In its simplest form, this could be an Internet "kiosk" consisting of a single terminal in a physically secure location, and it could function similarly to a public telephone booth. A more advanced form would be an Internet Café. This would consist of perhaps 2-4 publicly available terminals set up in a "social location"; e.g., a restaurant, the general store, or a meeting facility run by the local/native government. A possibility beyond that would be an electronic library or telecenter, with other IT resources available, e.g., fax, photocopying, other electronic information sources. If this is done on school grounds, as a broad educational and civic enterprise, it may benefit from the E-rate supported satellite link.

   Variants of these arrangements are being tried, sometimes with considerable success, in many developing countries around the world. However, little of it takes place in very small villages. But foreign villages do not have many of the advantages that Alaskan villages have. We do not know how large a village might have to be to have "critical mass," but we suspect that the equivalent of a VIE is a necessary (but not sufficient) condition for such a facility to take root in a community.

   In each of these arrangements, with the possible exception of one that might depend on access supported by the E-Rate, a modest charge would be levied for use, perhaps something on the order of $1.00 per half-hour of Internet connectivity, and other charges for other services. The income would be used to support the facility, e.g., equipment repairs, the purchase of new software, and perhaps at least partially fund a new year-around job in the village. We do not advocate that the VIE educational program supply the capital to set up any such facility. If this possibility were to be pursued, it would be something to be worked out locally by the VIE and other interested people.

2. Become a local ISP, managing a server with modems for local dial-up. This is a much more technically demanding function than (1) above, but it can be done. An "existence proof" is provided by Ernie Baumgartner's ISP in McGrath. A commercial ISP might be more inclined to set up such a facility in a village if they were confident of a local resident who could help manage it and help promote its services.

3. Provide "hand holding services" for all levels of users. Whatever else the VIE might do, it is necessary that he be ready and willing to help others on a one-to-one basis. He should be the local person everyone knows that they may turn to for help. This assistance would take a variety of forms, e.g., helping people set up their computers and connections at home, "doctor's visits" to diagnose and fix problems, an electronic help line, an Internet "advice column." If he can't solve a problem, he should know how to seek and obtain help via the Internet. In that regard, the virtual VIE community that is proposed as part of this program would be the first place he would go.

4. Help set up an Internet "commons" for the community. This might take the form of web sites, e-mail server, a village bulletin board, electronic newspaper, etc. In addition to a framework, he might work to get some substance established within the framework. For example, he might maintain an Internet help line or advice column, or find a senior citizen who would like nothing better than to start an active project to produce and maintain an on-line village history.

5. Help to get the Internet used more effectively in the schools. It is clear from even our modest visits to the villages that some of the schools do not have staff members who are knowledgeable enough to effectively or imaginatively integrate the Internet into education. Using the Internet to improve school curricula is a big subject in its own right. The VIE might be able to improve matters. We would not be surprised if a good number of prospective VIEs came from the ranks of the school staffs.

6. Show people how to engage in electronic commerce. This would cover both buying and selling. On the buying side, he would show people how to purchase goods and services, and how to do so in ways that minimize risk from fraud, etc. On the more difficult selling side, he might help prospective vendors set up web sites, and advise them on how to best promote their products or services and how to deal with customers. He would be expected to know something of the vulnerabilities, risks, and liabilities associated with engaging in e-commerce. If a physical infrastructure is necessary to support the forms of e-commerce that the village is going to engage in, e.g., a common system for marketing crafts for turning orders into shipped packages, he might help organize that as well.

7. Remain active in the VIE virtual community after the formal course is completed. This community will hopefully prove to be a source of further education and useful ideas, solutions to immediate problems, shared information, and socially useful and rewarding to each VIE as a member of a common interest group. It would also be a good place for him to share what he is learning, and to get and receive feedback on his work and experiments. It might even be the locus of some useful friendly competition between villages.

No claim is made that this list is complete. There are no doubt other possibilities, and we would hope that as the VIEs gain experience in their villages, that they would explicitly add to the list over time. Several of these possibilities are quite a bit more demanding than others. There would be no expectation that a newly minted VIE would go back to his village and implement all of these possibilities in short order. However, one would hope that as the Internet takes root over time, that a number of them would be successfully implemented.

These activities might be pursued in different ways by different VIEs in different villages. One result might in effect be to establish a new year-around, permanent job. This could either be done as a private enterprise, or as a position under the village governance structure. Either way, at least some of the salary would come from modest user charges of one kind or another. It might also be made part of the Federal or State

government structure, e.g., by using the Post Office as a village telecenter, and again charging for services..

These prospective functions almost dictate the desired characteristics for candidate VIE. They call for an energetic person who is intelligent, who is eager to be active in a dynamic area, who has good people skills, and who has a desire and the motivation to work to add something to his community (see section IV.H below on selection).

### (D) Constraints

A necessary condition for this program to have any possibility of achieving its intended value is that adequate Internet service is publicly available at an affordable price to any citizen in a village. In practice this would minimally mean something like at least 60 hrs/month at a cost of $20-30/month for an individual subscription, and with a 56 Kbs link to a village with under 500 people. This would be a minimal bandwidth to enable people to usefully access most web sites with tolerable time frustrations at the keyboard. Hopefully progress under section II above will make this condition look pitiful in a couple of years. While many less developed countries first came on board the Internet via services that included no more than e-mail, we do not think this is adequate for Alaskan villages today.

The VIE-in-training (VIEit) needs to have easy and nearly unlimited access during the distance learning portion of the course. Since this is an educational program, at a minimum we would expect that the VIEit would be able to get access to both the Internet and suitable equipment for his own use through the school connections. Perhaps part of the arrangement for this would require some sort of assistance or instructional effort at the school by the VIEit.

Native Alaskans have very high college drop out rates, even at universities within the State. They apparently do not like to be away from the villages for extended periods and they have problems coping with different higher-pressure social environments for extended periods. If this is correct, then it would be undesirable for the program to keep the VIEit away from the villages for more than a minimal amount of time, e.g., 2-3 weeks. In some ways, a course like this lends itself to distance learning.

Costs presumably have to be kept down. This also would tend to dictate a training program that minimizes time away from the village.

Different villages have different cultures and governmental structures. VIEs are likely to be more or less constrained in what they can do in different places. The program needs to be flexible enough to prove useful, for example, for a VIE who might be limited by the village customs or governing authorities as to how much free enterprise he can engage in, or by physical and other limitations on where and how he might “set up shop”.

We do not propose that this program provide capital or equipment, with the possible exception of a single personal computer (see below), to the VIE or villages. Perhaps some sort of small business loan program might eventually be set up to do this. Our emphasis is

to produce a knowledgeable and motivated VIE who has the initiative and can generate the support to make something happen back home.

**(E) Content**

The purpose of this course is three-fold: (a) to provide each VIEit with substantial technical skills; (b) to educate them about the values and problems of Internet use and potential, and (c) to get them explicitly thinking about what value what they are learning might have for the people in the villages.

We see the VIE development program as having three essential parts. The first two would be done under the umbrella of a formal course, and the third (and perhaps most important) part would be in the form of a continuing virtual group. The three parts are:

(1) A 2-3 week intensive course with a class of 10-15 students who would study at a common physical location.

(2) The continuation of this course, at a less intensive pace and through a distance-learning format, for another 9-12 weeks.

(3) A long term electronic "VIE Forum" or virtual community for continuing education, support, and maintenance.

Part (1). During the initial 2-3 weeks, all the members of a class would be brought together for what would essentially be a full time activity. They would be given intensive basic training and practical independent or group exercises under close supervision.

At the end of the 2-3 week period, the students would be given a "check out." Each will have to demonstrate the successful completion of an independent project on a subject that fits well with the goals described under section IV.C above. Furthermore, each will be required to load and configure a personal computer to take back to his village and use to complete the rest of the program. Each student will also have to show that he knows how to get himself connected to the Internet upon return to his village. Any student who cannot meet these criteria will not be continued in the course.

One of the reasons for having the students together for this initial period is to build personal and networking relationships among the members of each class. Every VIE, as is the case with almost every serious Internet user or professional, has these. We want to build some potentially useful working relations, and a sense of collegiality among the class members. We would expect these to prove immediately valuable during the remainder of the course (Part 2), and more so during Part (3). So each student leaves the

first 2-3 weeks of our course bonded with a set of professional colleagues sharing close common interests.[19]

Part (2). Each student returns to his village, and the course is continued for 9-12 weeks as a distance-learning class. The pace and intensity are reduced to that of a 3-4 credit hour undergraduate university course. Substantive work continues in the forms of developing technical skills and individual and group projects, but these are now handled electronically.

During this period, each student will be required or encouraged to engage in activities using his embryonic skills in the village. This might be something like a volunteer at the school or clinic, or perhaps do some other work directly under one or more of the categories listed in section IV.C.

At the end of the course, the student will have to pass a qualification examination. Ideally, we would like to see the instructor visit each student in his village and check him out on a personal inspection. Another, more costly, possibility would be to have everyone re-assemble for a final week together. Successful completion of the course should end with the award of a formal certificate.

It doesn't make sense for us to try to specify a complete and detailed syllabus for this course. However, we do believe that certain kinds of material need to be covered. This subject matter would include:

- Basic technical and information retrieval skills. How to set up computers, including installing and configuring modems and network cards. How to set up and use e-mail, web sites, chat rooms, etc. How to find people and information on the WWW.

- Specific information and shared experience on how to accomplish the functions discussed under section IV.C above. This would be a combination of technical and business expertise. Some of this might include how to build advanced web sites, how to estimate certain kinds of costs, write a basic business plan, etc.

- How to deal with the infrastructure, e.g., electric power provider, the phone company, ISPs, local government. A VIE should be able to solve the problem of how to get something fixed that is broken and under the control of one of these providers.

- Material on the risks out there on the Internet. Our VIEs are going to be dealing with some young and old people, not to mention lots of people who do not have much money, and who may be naïve about the risks involved in using the

[19] In order to expand the personal networking beyond classmates as well as to further the continuing education aspect, it may be worthwhile to hold in-person conferences every two years or so. These might be partially supported by a new or existing industry association.

network. When one learns to drive a car, one learns about safety, caution, and courtesy. One learns to protect oneself and avoid doing stupid and dangerous things behind the wheel. The same is true of the Internet. We don't want a lot of villagers defrauded, among other things.

- As the course evolves, we expect the instructors to build up a database of material on differences among villages, dealing with special problems that arise during peak seasonal use (e.g., the last couple of months of winter), etc. that favor certain kinds of activities over others. Ultimately this would provide a student with "you might try this" lists or cases to take home. We would expect this to be used in each class, and become part of the holdings of the virtual community of Part (3).

There is no expectation that all of this material can be covered in the depth to achieve all of the possibilities outlined in section IV.C in a single course. If this program is to be pursued, the initial organizers will have to make some choices as to focus.

Given the varied backgrounds of the prospective students, and the responsibilities we would hope they take home, we think class size should be kept to 10-15 students. Each student will need considerable attention, and that becomes difficult for a single instructor once he has charge of more than about 15 students. At the other end, we do not want the initial class size to be too small. An important part of this program is to build a network of common interest. If the class size starts out with fewer than 10 people, and there is some attrition, you are not left with much.

The total duration of the course would be 11-15 weeks, i.e., the length of a standard university quarter or semester. It could be offered 1-3 times per year, depending on funding and interest. It could also be offered on a "rolling" basis, with a new start-up class every 4-5 weeks, i.e., while some predecessors continue in their distance-learning phases. Scheduling might be seasonal to coincide with less active periods in village life.

Part (3). A virtual community for VIEs should be set up and maintained. Initially, at least, the course instructor should do this. The electronic framework should consist of e-mail, a web site that is so well constructed that it serves as an example to emulate, several databases, a chat room, a newsgroup and whatever else provides options that help promote a sense of a professional community of common interest.

Over time, this community would expand with the addition of each successive class of VIE graduates. Others who are sympathetic to the goals of the effort might also be included. Links would be maintained to most village web sites, and other collective web sites and databases would be created as they are needed.

The community would be a forum for sharing ideas and solutions to common problems, further practical education, etc. They might also do well to set up useful competitions, e.g., have an annual award for the most innovative application or web site, or for the most singular Internet-based act of value for a village.

If the formal course eventually obsoletes itself, e.g., after producing "enough" VIEs to accomplish its purpose, the virtual community might still be well maintained by the "alumni" or perhaps by some consortium of ISPs.

### (F) Qualities and duties of the instructor

If this program is to accomplish what we intend, we will need a course instructor who is:

- Knowledgeable of and sympathetic to Bush life.
- Prepared to engage in further and ongoing dealings with students beyond the duration of the formal course via the virtual community.
- Capable of teaching a wide range of skills and consciousness-raising.
- Is highly motivating, and recognizes the importance of this factor in his work.
- Can infuse the members of each class with a sense of mission and value to their villages.

Especially initially, the suggested program is going to be very difficult and demanding to organize and run successfully. This point cannot be overstated. The choice of instructor is clearly very important, as this is something of an unusual and perhaps delicate program. It may make sense to get a detailed course proposal from the prospective instructor before making a choice. Once the instructor is chosen, he should be given time and support to carefully organize the course. This preparation should include a close look at other training programs undertaken with less developed parts of the world in mind, and an assessment of what might be needed and done most quickly and successfully in Alaskan villages. It may also make sense to undertake a pilot program with an especially sympathetic instructor as a way of cautiously working towards something more ambitious and with a higher profile.

### (G) Logistics

Organizationally, the program would be straightforward. There would be a director, a chief operating officer (COO) who would be the course instructor, a part-time administrative assistant, and a panel of overseers. The latter would serve as an advisory board, do periodic evaluations, and participate in the selection of the instructor, focus, and participants. The director might be someone from the organization that provides most of the funding, would devote at around 10% of his time to this program after it reaches a steady state (but considerably more in its early stags), and preside over the board's meetings.

Criteria for the evaluation of the program would have to be worked out. These would have to go beyond the usual student "course evaluations" of the instructor. In this case, it would be appropriate to include measures of VIEit completion rates and assessments of the post-graduation absorption of the Internet in the villages.

Some kind of administrative headquarters for the program would also have to be established. The COO would have at least a half time administrative assistant. If the headquarters were located at a university, that assistant might be a student who would also help administer the course. If a university is involved, the course might be given college credit.

The major logistical burden of the program, beyond its initial establishment, is likely to be during the 2-3 weeks where all the students of a class are learning, living, and working together. Arrangements for transportation, as well as classroom, laboratory, and dormitory space would have to be made.

With only 10-15 students per class, the logistics should not be too much of a problem. There are probably several places that would be physically suitable. Since this course does not need to be coordinated with the existing terms of any university in the State, there is some flexibility to schedule it when facilities are more readily available. The distance-learning portion of the class would only need a facility for the instructor. It might even be done out of his or her home.

Arguments may be made as to the advantages of one location over another for Part (1) of the course. A case can be made for Anchorage because the students might be exposed to a larger, more sophisticated community of Internet-interested people, there are more impressive and prestigious facilities and people to be visited, etc. But physically it might be held as well in towns like Bethel, or Nome, or Galena, and costs might be lower. Perhaps the most compelling criteria might be the preferred location of the best possible instructor.

Each VIEit would need to have effective access to an affordable Internet service back home. See sections II and IV.D above and section IV.H below.

**(H) Selection and support of participants**

It is obviously important to identify and attract the most suitable participants. In particular, it is important to have a successful first class, and the selection of this class should be done especially carefully.

Again, the criteria for "most suitable" are intelligence, energy, enthusiasm, sense of responsibility, and interest. Education beyond high school is not necessary. Other factors, such as age or gender, are not important. The most suitable person in a village may well be a vibrant female senior citizen who may not even have completed her last year of high school.

Depending on how much profile and support the State of Alaska would like to give to this program, there are several possibilities for the selection of participants.

(1) Give the program a good deal of publicity and have a statewide competition for the positions in the class. Support might be in the form of a named scholarship, and formal selection would be by a fairly high profile committee. Application might include an essay on "why I want to be a VIE."

(2) Obtain nominations from village leaders. On the positive side, this approach may produce people who are better "screened" than those who might be chosen by an ephemeral committee, and having been "officially" chosen by one's peers and leaders, the participants may feel a greater sense of responsibility. Involving village leadership may also attract more attention to the program and agreement on the desired results. On the negative side, it may put the choice of nominee in the hands of some of the most clueless people in the village. There may also be the awkward problem of turning down or failing a person who was so recommended.

(3) Have a good recruiter, perhaps the instructor, go around the countryside and personally identify prospective candidates. He would then do the recruiting, either one-on-one or in some other way acceptable to a given village, with whatever resources he could muster or that would be put at his disposal.

(4) Look to a more limited pool of prospective participants. For example, one might constrain the initial participants to be chosen from the current or recent past graduating classes of the village schools, or from the village school staffs.

Combinations of elements of the four possibilities listed above are also possible. This list is not meant to be exhaustive.

It is hard for us to judge how much participatory interest there would be in such a program. It's one thing for there to be a groundswell of interest, quite another if finding participants would be like pulling teeth. Obviously one thing we would not like to see happen would be for this to be given a high profile and then have nobody express any interest. If that is a serious concern, a reasonable way to deal with that possibility would be to have a pilot program, perhaps using a combination of (3) and (4) to select and nurture several people for an experimental rendition of the course.

Several forms of support will be necessary for this program. Most obviously, there will have to be payments for an instructor and the use of classroom, IT, and dormitory facilities for the first few weeks, and continued use of IT assets for the rest of the duration of the course. If the program were to be successful over a long term, support would also have to be provided for maintaining a least an ongoing web site, chat room, etc., for some years. Hopefully, this might eventually be taken over by some group of program alumni after they have progressed professionally.

We expect that the students would also have to be supported in several ways. All of the students would have to have a scholarship to cover their tuition, travel, and living costs for the initial 2-3 weeks. Beyond that, every student would need to have their electronic access to the rest of the group, and to the Internet more generally, covered for the duration of the program. This might well include coverage beyond the course, and some criteria for good standing might have to be established for that continuance, perhaps for a year beyond the end of the course itself. This subsidy should not be indefinite. All the VIEs will be expected to stand on their own after a while. We need to keep in mind that

the major reason for having such a program is for the participants to take something back to the villages and help themselves and their communities up the learning curve.

Finally, there is the issue of the hardware and software the participants would have at their disposal once they return to the villages. Perhaps, each participant should be given a fully loaded PC to take back. Each person would be given his machine at the beginning of the course. He would work on it during the intensive 2-3 weeks when the class is physically together, set it up under the instructor's supervision, and take it back to the village for continued use if his progress was considered satisfactory during that initial period.

## V. Conclusion: Bridging the Alaskan "Village Digital Divide"

Our task has been to consider three basic problems that would help bridge the Alaskan "village digital divide":

1. Forms and costs of providing Internet capabilities to villages.

2. Expanding the range of uses and the size of the user community within each village.

3. Professional development of teachers, "bright kids," and others at the village level.

The ultimate and most important goal is to help solve Problem 2. Problem 3 is important in its own right, and clearly not all people are equally interested in, or able to benefit from, the opportunities presented by the Internet. But we also believe that a good solution to Problem 3 is probably necessary and a good way to leverage progress on Problem 2. A good solution to Problem 1 is a necessary condition before much can be done with either of the other two, and we are aware that many people in Alaska have been giving the problem of affordable access considerable attention.

Accordingly, most of our thinking and recommendations have been focused on developing a program, with Alaska's particular circumstances in mind, that would try to help solve Problem 3 in a way that is explicitly intended to significantly contribute to a solution of Problem 2. The program we describe and recommend will hopefully be a fairly low cost way to create a critical mass of resident, capable, and responsible people whose interest it is to work on the second problem. But we should emphasize again, that it is an aggressive program that has not been tried elsewhere to our knowledge. It is fairly high risk since a great deal of emphasis is placed on generating motivation and initiative.

The international history of the Internet has many examples of single individuals who have been able to be constructively influential at a local or national level, and have done so largely on their own initiative. Mike Lawrie, then of Grahamstown, Republic of South Africa, was the head of academic computing at Rhodes University. He would invite one or two bright, enthusiastic, people from each of several other countries in southern Africa to his home. This person or two would live with Mike for a week or two, and he would

show them how to set up a UUCP (Unix-to-Unix Copy Protocol) site, how to manage it, and how to acquire and use new applications. They would then go home, and literally put their country on the Net in an affordable way, and act as a source of help for others. He did this on his own, independent of his duties at Rhodes. More than a half dozen sub-Saharan African countries were initially "wired" in this way. One of the countries he helped set up was Namibia, a poor country with the added misfortune of then coming off a very destructive civil war, and a country that had the further misfortune of being between South Africa and Angola during their conflict. One of the people he helped set up was Dr. Eberhard Lisse, a "baby doctor" in Windhoek who delivered literally thousands of native babies a year. Lisse brought his enthusiasm and helping hands to many others in Namibia, including the government and educational community. Already in Alaska, a few people like Ernie Baumgartner, on their own initiative, have shown that a single person or a small number of knowledgeable and helpful people can make a big difference at the village level. Given the fairly modest scale of the problem, we think a good way to handle the problem is to educate and motivate some more good people and then let them go to work.

## VI. Glossary

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| APU | Alaska Pacific University |
| ASTF | Alaska Science and Technology Foundation |
| COO | Chief Operating Officer |
| DSL | Digital Subscriber Line |
| FTS | Federal Telecommunications System |
| Kbps | Kilobits Per Second |
| Mbps | Megabits Per Second |
| ML&P | McGrath Light & Power |
| POP | Point Of Presence |
| USF | Universal Service Fund |
| UUCP | Unix-to-Unix Copy Protocol |
| VIE | Village Information Expeditor |
| VIEit | VIE-in-training |
| VOIP | Voice Over Internet Protocol |
| YKHC | Yukon Kuskokwim Health Corporation |