"Fostering Native Self-Determination in Primary Care, Prevention and Health Promotion"

YUKON KUSKOKWIM HEALTH CORPORATION

May 25, 1998

96-45

The Honorable William E. Kennard
Chairman
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, DC 20554

The Honorable Susan Ness
Commissioner
Federal Communications Commission
1919 M Street, N.W., Room 832
Washington, DC 20554

The Honorable Michael K. Powell
Commissioner
Federal Communications Commission
1919 M Street, N.W., Room 844
Washington, DC 20554

The Honorable Harold Furchtgott-Roth
Commissioner
Federal Communications Commission
1919 M Street, N.W., Room 802
Washington, DC 20554

The Honorable Gloria Tristani
Commissioner
Federal Communications Commission
1919 M Street, N.W., Room 826
Washington, DC 20554

Dear Commissioners,

This letter is written to request FCC consideration regarding a recent letter from the Alaska Public Utilities Commission (APUC) dated May 6, 1998. APUC has requested FCC assistance in resolving the issue of Eligible Telecommunications Carriers for rural health care services. As a rural health care provider, we believe it is absolutely critical that all Alaskan carriers, both Local Exchange Carriers (LEC) and Long Distance Carriers (LDC) be allowed to participate in the bidding process for Rural Health Care Universal Service Funds. The current FCC ruling effectively creates both a single service provider for rural health care services in the villages of rural Alaska and a lack of subsidy for interexchange providers. Thus the cost for rural health care services can be expected to be exorbitant. We believe there is another, more cost effective, solution, but it requires an FCC ruling to provide competitive access to the Internet in all rural areas. The FCC must change it's eligibility requirement that carriers providing service for rural health care providers (RHCP) must currently provide local services as defined in section 47. CFR Subpart B services. Without this revision, the rural health clinics in Alaska will not have Internet access and the consortiums formed to provide the current limited services will be forced to disband.

The Yukon-Kuskokwim Health Corporation (YKHC) is a not-for-profit rural health corporation in southwestern Alaska, serving 58 communities that are not connected by roads or telephone land lines. Due to limited resources and great technological needs, it is difficult for local people in rural Alaska to find cost-effective methods of establishing the telecommunications infrastructure necessary to connect with other Alaskan communities and with the rest of the world. In particular, the needs of YKHC include distance delivery of education to our remote rural health care providers, capability to transmit health data for aid in diagnosis and treatment, and Internet access for health care resources and research.

To this end, YKHC has partnered with a number of school districts and tribal organizations in the Yukon-Kuskokwim Delta to form the Distance Delivery Consortium (DDC). We see this organization as a united partnership to help all groups achieve fair and equitable distance delivery services while preserving the community spirit of the villages. By joining together teachers, students, parents, health care workers, and tribal members we hope to bring affordable telecommunications to our schools, tribal organizations and health clinics. The schools and libraries function under different USF rules than the health care providers. The inconsistency of eligibility for carriers effectively prevents YKHC from continuing this partnership. One of the main goals of the DDC is to bring cost effective, appropriate telecommunications in the underserved , expensive satellite delivery environment.

Currently, the DDC partners are working to bring Internet connectivity to the villages of the Delta. The DDC and it's various member agencies have worked very hard to secure grants to achieve these goals. An NTIA grant (TUNDRA) will help to establish a new level of connectivity among the schools, governments, and clinics through the use of a wireless village area network (VAN) and shared access to the Internet via a 56 KB satellite connection. The same technology planned for this project was discussed by Mr. Charles Iseman, FCC attorney and chief of the spectrum policy branch, in a recent article written for *Telemedicine & Telehealth Networks (Feb '98)*.

This VAN project will help to break down the barriers that isolate village life from modern medical advances. The TUNDRA grant represents the use of advanced and appropriate technology in bringing networking solutions to our villages. This project will install a core of hardware and software that will permit community-wide connection to whatever "network socket" is put into service, regardless of the provider. As new advances in technology and Internet access become available, we believe the VAN solution will provide capabilities for expansion and upgrades well into the next century.

We believe that a wireless network may be the most cost effective solution for our schools and health corporations, as well as, the most cost effective solution for the use of Universal Service Funds. However, current rulings stand in the way of the completion of this project. It is necessary to use a satellite connection to bring the Internet access to the VAN. The only carriers providing the satellite connection to the Internet in Alaska are ineligible to receive support from the USF for rural health care services. We ask the FCC to consider eliminating this barrier by changing the eligibility rulings for competing carriers.

Enclosed is a copy of a white paper discussing the proposed technologies and the social ramifications of carrier choice. Thank you in advance for your consideration of these issues. Please feel free to contact me if you have any questions or need further clarification on this matter.

Sincerely,

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cc: Martin Leonard, DDC Coordinator
Commissioner Sam Cotten, APUC

The effect of local network distribution of the Web: Discourse design in Western Alaska villages

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Abstract

The effect of local network distribution of the Web: Discourse design in Western Alaska villages

The Internet reaches many places. One place it does not yet reach is the Yukon-Kuskokwim Delta in Western Alaska. Some 50 villages of the region are poised to incorporate the Web for remote delivery of instruction, as well as, routine data exchange over the network. For the past year implementers of that network have examined various network topographies, hardware installations, and software applications for their contribution to potential discourse design.

Discourse design involves two aspects. First, discourse design is a means of describing message exchange features. Second, discourse design is a means of engineering message exchange environments by attending to malleable dimensions. As Internet access is built out to the villages of Western Alaska, local distribution of electronic messages has become a malleable feature. We must act to choose between competing delivery methods. Although simple lack of telecommunication provider infrastructure has limited distribution potentials in the past, we now have a choice between a wired or wireless distribution solution. Whichever choice is made, the network delivery method stands to have a large impact on the kinds of messages exchanged across the system.

The effect of local network distribution of the Web: Discourse design in Western Alaska villages

The pioneers of Web-based instruction have proven that it is possible to move education effectively into a computer networked environment. Computers are not only repositories of information or number crunching adding machines, but a viable communication channel between learners and teachers and among students themselves. Problem-based learning and collaboration with practicing professionals adds realism to academia in ways that before now were logistically impossible. The educational environment has successfully moved into an entire community surrounding the student. As instructional designers, we are now considering ever finer points of web delivered courses, such as, what instruction to deliver, how to apportion costs, and how to adjudicate the teaching load in an era without accountable seat time.

Networked technology has become widespread enough that its mere existence is no longer news. Enough locations have access to the Web that long range planning can include a dependence on asynchronous multimedia delivery as a major component of the instructional mix. The Web is here, it is proven, and it is just a wire coming out of the wall to the majority of the users. The age of the pioneer is past, but the age of the ideal is not yet upon us. The ideal of the Web is that a user in any place can be connected at any time to any other place. However, at our present non-ideal level, it still matters where that wire goes once it disappears into the wall from the back of your computer. Our delivery design work is not yet complete. As we contemplate the discourse enlivened by the Web and move towards effecting design structures on that discourse, we must still take into account the constraining forces inherent in how basic connectivity is produced.

This paper uses a communication perspective to describe a scenario in Western Alaska affecting more than fifty communities. The goal of ubiquitous Web-based instruction necessarily includes the local distribution of connectivity. But the nature of that connectivity will effect the kinds of messages that are sent across the network. At stake is the effectiveness of the network to meet design goals, as well as, millions of dollars a year in telecommunications charges. You can be assured that determining who gets the millions of dollars available for Internet access is currently an inflammatory political issue which creates obvious side effects for intended deployment of communication hardware.

Communication theory of discourse design offers an analysis of the components inherent in the scenario to provide Internet access to the villages of the Delta. We may think that gaining access to the Internet is an economic matter for each individual subscriber to negotiate. A tariff is set, either by a Public Utilities Commission or by market forces among competing Internet Service Providers, then individuals, schools, and commercial enterprises simply budget the money to buy service. Unfortunately, it is not that simple in Western Alaska. The gaining of access by one user may preclude access by other users. Providing Web access through a for-profit single company to separate individuals versus providing Web access through a non-profit consortium of users can be predicted to have far different outcomes for community-wide discourse. For instance, if all the connections from one user to another in a village are via the Internet

and the Internet Service Provider (ISP) has their node in Anchorage, then if the link goes down there will be no local connectivity. However, if there is a local node by way of a proxy server or some other kind of router, then local business can continue despite loss of connectivity outside the village.

We normally assume that the internal organization of whatever utility gives us Web access is beyond the pale of our design considerations. Central Computing at the university simply runs the show in some opaque way. Or maybe, we sign up a local ISP to carry the output of our Local Area Network (LAN) to the Internet. We rarely have a need to make a choice of anything other than cost and level of service. The Internet is simply available or not. It is a useable speed or not. We can pay for it or we can't. Normally, in the realm of Web-based instruction we begin our discourse design at the desktop where we decide on software applications and participant access privileges. The villages of the Yukon-Kuskokwim Delta in Western Alaska don't have such straightforward luxury. Our design of the community discourse using a Web-based instructional system begins with the local telecommunication hardware, political statutes governing satellite time, FCC rule making regarding Universal Access, historic cultural patterns, and the weather.

Situation in Western Alaska

Western Alaska is arguably the most remote place in the United States with some of the worst weather. No roads connect the 50 villages of the Yukon and Kuskokwim River valleys in an area larger than the state of Arizona. Some 20,000 people live in the Delta. Excluding the regional hub community of Bethel with 2,500 non-Natives, 94% of the residents are Yup'ik Eskimo, Cup'ik Eskimo, or Athabaskan Indian. More than 90% of the Native population speaks an aboriginal language as a first choice. Yup'ik speakers can understand each other throughout the region although local linguistic variation is sufficient to place any speaker as a member of a particular village. Coastal village contact with Western explorers and whale hunters dates from the 19th century, but most of the area has been in contact for only 40-75 years.

Yup'ik, Cup'ik, and Athabaskan cultures are centered around subsistence activities of hunting for land and sea mammals and migratory water fowl. Traditional values continue to stem from the relationship that the people have with the land. Native spirituality is rooted in the knowledge of how the people can maintain proper balance within their environment while utilizing the resources (i.e., fish, game, birds and plants). Traditional cosmology finds an unbroken circle of physical, psychological, and spiritual forces.

Property is largely related to the successful quest for and management of traditional natural resources. Acquiring personal wealth is severely frowned upon. In its essence, traditional society on the Delta within memory of the current population is decidedly communal. A dominant Native value is to not be seen as striving to be better than others. The first catch of an animal in the season, like the first catch of an animal a person makes in their life, is completely distributed around the village. Traditional education emphasized the development of a personal awareness of the cycle of nature, having a reverence for subsistence resources and encouraged the widest possible distribution of resources for community benefit. These values bonded the social network of the community, strengthening cultural philosophies that promoted healthy family and

kinship systems; encouraging the sharing of food, working together and celebration of life. Non-native school teachers have often commented on their inability to get students to volunteer answers in open recitation. Their conclusion has been that the students are universally shy. A better conclusion is that expressing the right answer shames another student who does not know it. Deference is a way of life.

The practice of a completely traditional way of life is behind us at this time. It was a hard life fraught with danger and uncertainty and it is not remembered in false nostalgia. The advent of machines for transportation, rifles for hunting, insulated protective clothing and telecommunications have been rapidly embraced by Native communities in the Delta . However, health and social service studies have commonly recognized that the continued high levels of alcoholism, suicide, and domestic violence are directly related to the rapid pace of social change accompanied with a pressure on human values within Alaska communities. Even though the Indian, Eskimo, and Aleut population comprises only 15.58 percent of the general population of Alaska, the Alaska Division of Alcoholism and Drug Abuse reported that of their 7,998 non-duplicated clients, 46 percent were Alaska Native. Since Western contact, contemporary values have been thrust upon the villages through western education, religion and governing systems which conflict directly with traditionally practiced values. Forced changes in lifestyle, eating habits or food sources, family member roles and responsibilities resulting in high stress levels has contributed greatly to the overall poor health status of Alaska Native peoples.

Not surprisingly, the socioeconomic status for the Yukon-Kuskokwim Delta is also lower relative to the rest of Alaska. Of those persons over 25 years of age, less than 56% are in the labor force. Unemployment often exceeds 80-90% in Delta villages. More than 40% of the region's families have incomes below the Federal Poverty Line. This compares to the statewide figure of 12%, and ranks the highest in Alaska. The household median income in the Delta, $20,524, is less than one-half that of the state average of $41,408. Delta per capita income is $7,121, compared with the State of Alaska per capita income of $17,610. In addition to having less income than other Alaskans, families living in this area must contend with a higher cost of living, spending 62% more per week on food, 165% more on electricity and 46% more on a barrel of heating oil than does a family of 4 living in Anchorage.

The enduring context of Western Alaska includes a reliance on group identities and extended families, a strong desire to promote the common good without personal aggrandizement, low population, and a harsh climate. Communication network design aimed at supporting healthy communities in this case seeks to incorporate the above human values within geographical physical realities to create healthy discourse.

Cost/Performance of Connection Options

Massive recurring line charges threaten to constrain access to the Internet in the villages of Western Alaska. Despite 90% federal subsidies promised through the Universal Service Fund to promote Internet connectivity, important participants in community dialogue are threatened with exclusion. Basically, connectivity comes in two parts. First, there is the link to the Internet which, from Western Alaska, means a satellite earth station and an Interstate Provider. Second, there is the distribution of the data signal within the village. We have a seldom seen opportunity to include the distribution

mechanism itself in our planning for the communication flow in a village setting. However, in the present case, the distribution mechanism can have an enormous impact on the dialogue it carries. Some groups of users in a village will have access to electronic communication and others will not depending on the mechanisms of control of the local distribution network. Control of the network access by an entrenched for-profit telco is one scenario, control of access by a non-profit consortium of users is another. The local distribution is the malleable dimension examined for its effect on web-based instruction in this paper.

Villages in the Yukon-Kuskokwim Delta have populations ranging from 100 in Oscarville to 1100 in Hooper Bay. Telephone service to the region is less than 20 years old and data links are less than three months old. Remote, rugged terrain teamed up with low populations living at the poverty level to assure no interest by service provider organizations like ATT and GTE. That is, until the Telecommunications Act of 1996 opened the door for subsidies for schools, libraries, and health clinics. The regional school districts immediately solicited for bids to provide Internet access to their students. Susan Ness, a Commissioner of the Federal Communications Commission, visited the Delta in October 1997 on a fact finding mission. Western Alaska became a high profile case to test the creativity of network design. By November, a long distance company had planted VSAT dishes next to school buildings throughout the Delta and began providing 56kb Internet service.

April, 1998, the Lower Kuskokwim School District initiated a competitive bid process resulting in an agreement with ATT to supply 56kbs service to its 26 village high schools for $1.2 million dollars per year. That amounts to about $3,800.00/month for minimal service. The next lowest bidder for the Lower Kuskokwim School District business was asking $1.8 million for the same level of service. The other major Universal Service qualified user of Internet connectivity is the regional non-profit health care provider. The cost would be $2.3 million per year link its 50 village clinics at similar speeds. At these prices clearly there is not an option for duplicate service to any single village. The FCC has supported aggregating the long distance connection as a way to save millions of dollars per year in federal money. Such an aggregation would also serve some important community-wide discourse needs, but it is not without its detractors.

Part of the high cost/low performance of service in Western Alaska can be explained by an antiquated local loop and part can be explained by the necessary satellite link between villages. Western Alaska has no road connections at all. The terrain and weather collaborate to prevent any roads, or even antennas on poles, from enjoying long lives without constant maintenance. The ground is permanently frozen except where there is any disturbance of the ground cover. All the buildings in the Delta must be built on stilts to prevent them from falling through the soil. Even the hospital in Bethel sits on refrigerated columns. Fifty mile an hour winds and raging blizzards are common ten months of the year. There is just too much distance and too few people to build the kind of telecommunications infrastructure that is common outside Alaska. And there is one more factor as well. All local distribution of telecommunication services has been provided by a State-mandated monopoly. That company has not found it prudent to invest in fast digital switches or routers. They have reluctantly entered the data delivery arena after being forced to do so by threats of loss of their monopoly. In addition, their

contentious business practices have produced legal actions against all their previous and current partners. In short they are hard to deal with. They have proposed to create dial-up connectivity in villages for $40-$90/ month for 25 hours of connection. That service is not now available and it is very doubtful that it would become widely available due to lack of affordability by local residents.

Five years ago a consortium comprised of the regional school districts in the Delta, the Native non-profit health care corporation. the PBS television affiliate, and numerous community development groups, took the initiative to create a network for electronic mail connectivity. All the villages got a FirstClass mail server and thus became a Wide Area Network (WAN) for text based message exchange across the Delta. The plan, which was funded by TIIAP, called for working with a long distance provider to install four 9.6 dialup modems in each village. The mail servers were deployed in the local schools and now host some 5,000 accounts, but the installation of dial-up modems to connect other local users was delayed. Then the technology changed.

Presently spread spectrum wireless devices are capable of transferring data from LAN to LAN, or from a single exterior user to a LAN, in a 3 mile radius within a village at 2.4 mb bandwidths (see D. Hughes, NSF reports, 1995-98). Speeds in this range can allow multimedia networking. The signal from the wireless cloud over a village could then be routed direct to a satellite and on to the Internet without including the present local loop with all its physical and political limitations. Since the users could purchase the necessary hardware themselves, recurring line charges are moot. Advances in communication technology thus have created an affordance for a fast local network without high maintenance costs. In short, new discourse solutions are possible. Users in a village who could not afford to be a part of the electronic network before now could now be given access to the wireless cloud. Collaboration within a village in an asynchronous environment could have a profound impact on village life, with or without long distance connections to the Internet. The non-profit consortium of users has federal grant money to purchase equipment to connect all 50 villages. Everyone should be hailing this as a great breakthrough. But such is not the case.

Just as the advent of the Web gave us a new tool think within the realm of instruction, we now have a new tool to think within the realm of the distribution of access to the Web. We have a chance to plan a different kind of message distribution within a village and between villages. But what sort of design should we have? How will the design we construct meld with normative values in this physical context? What side effects can we expect from our design? And what unintended consequences will occur?

Network Discourse Design Goals

The author has been hired by the Yukon-Kuskokwim Health Corporation, an Alaska Native owned and managed health care delivery non-profit organization, to design and implement a distance delivery network for Web-based instruction to village health aides throughout the Delta. The corporation has one general goal for an electronic messaging network in the remote villages and three more specific ones. The general goal is to expand health care efforts beyond an emphasis on acute care of injuries and diseases to more holistic community wellness. The corporation is moving into a managed care atmosphere that will involve a direct commitment to preventative measures and healthy living. Much of the efforts of the health care delivery will be geared towards supporting

and maintaining healthy communities rather than just treating the victims of unhealthy ones. Communication among the village entities is an important part of the plan. Three specific goals for a network among health aides include: 1) to enable the local input of data into a region-wide patient database housed in the regional hub of Bethel, 2) to shorten the basic training stay in Bethel by moving some of the instruction to the Web, and 3) to expand the educational offerings available to all care providers by accessing online Web-based courses delivered from multiple locations.

The network will be utilized for routine patient data and improved consultation with the regional hospital staff through email text and graphics. Even simple telemedicine applications that can add photographs to email could save lives and time, as well as, dollars (Iseman, 1998). Routine management of data at the primary source of contact can significantly reduce processing redundancy elsewhere in the system. Peer-to-peer communication and collaboration between students and local professionals are crucial to constructivist learning in this context. Reliable Web connectivity can enable access to the hundreds of online classes for health providers who want to expand their skills and meet certification goals without the hardship of leaving a family behind in a village. Delivery of basic instruction to new health aides in the village setting will improve retention of skills, save the costs of relocating to Bethel ,and save the logistical difficulty of covering clinic duties for the absent worker.

Presently some 185 individuals are working full-time as health aides. Most of the health aides in the Yukon-Kuskokwim region are women ranging in age from 25-55. They have the equivalent of a high school education when they are hired. Typically they complete four sessions of four weeks each for their basic training over a two year period. They are required to leave their village and families to stay in Bethel for each of these sessions. However, the four week periods represent a hardship for mothers with small children. In addition, adults in the Delta are always in constant preparation for seasonal subsistence activities. There is not any convenient time period in the year to leave the village for a month. If half of the instruction could be done via the Web, all of the health aides would be much happier and the corporation would save significant amounts of money.

The challenge is formidable, but the payoffs could be enormous. Weather and distance makes health care as it is known in the rest of the United States virtually impossible. The only doctors in the entire region are found among the 21short term contractors on staff at the YKHC hospital in Bethel. In the best of circumstances, a medivac by helicopter or fixed-wing aircraft from an average village to the regional hospital of a seriously ill patient will take at least four hours. However, it is not uncommon for weather to prevent any travel in or out of a village for a week at a time. It is snowing in Bethel now as I write this on May 24th.

Discourse Design

Discourse design has two essential meanings. As a descriptor of a messaging system, it is the explication of the features of message exchange with some emphasis on the ramifications of things like control of topic introduction, salience of backchanneling from participants, enforced pause rate among participants, and embodied authority. On the other hand, discourse design is also a means to engineer a messaging system with the infusion of normative values into the intentional affordances and constraints of message

exchange. We can enable anonymity or not. We can provide asynchronous threaded conferencing or not. We can enable user control over Web pages delivering courseware or not. And we can select a distribution system owned by a for-profit company with recurring line charges or not. Each of these choices in the design has intended good consequences justified by shared values, predictable unfortunate side effects, and unpredictable unintended consequences.

Discourse design is characterized by an attentiveness to malleable features and an awareness of unintended consequences (Aakhus, Madison, & Jackson, 1997). Some discourse features are readily visible and obvious: such as, gaining and relinquishing speaking turns, status definition moves, question and answer sequences, or synchronous versus asynchronous message transfer. Such features like gaining and relinquishing speaking turns are common everyday events that have a multitude of possible configurations. For instance, in a face-to-face environment, the feature of nonverbal signaling for a speaking turn is evenly distributed among the participants. Anyone can see others behaviors and be seen. The distribution of that feature is not malleable. However, in a computer-mediated environment, the nonverbal means to signal a desire to speak is malleable. Choices for the discourse designer allow all speakers to have both verbal and nonverbal means to signal desire to speak, or nonverbal channels limited to select speakers. We can attend to nonverbal backchanneling as it impacts human values, observing side effects of manipulating access to nonverbal channels and compare our outcomes with unintended consequences. We can then apply our understanding of the importance of that feature to discourse design.

Any discourse system is indefinitely describable. There is no limit to the number of features that can be found associated with a particular discourse system. However, as we move from one context to another we find that some features suddenly become malleable and therefore open to structural design. Some apparently innocuous features may be predicted to have large unintended consequences. For instance, the nature of the organization that provides internet access to the school may be one of those features with amenable to designed outcomes, fraught with unfortunate side effects to be wary of, and accompanied by unintended consequences.

Intended Goals

The intended goal of introducing Web capabilities to a village include the three specific aims for health aides of streamlining data entry for patient records, shortening stays in Bethel for basic training, and enlarging opportunities for continuing education with a constructivist approach. However, villages in Western Alaska have several other identifiable entities who could benefit by being part of the electronic discourse. The tribal governments can benefit by increased access to legal and state information resources. The school can integrate their student cohorts in real time collaborations with other students or with the local health aides thus achieving complex learning goals. The village store can facilitate its inventory control by exchanging data with its vendors. Federal agencies like Fish and Game Management who may have a presence in a village can coordinate its oversight of natural resources. And new entrepreneurial opportunities for village residents can be realized. If the design of the network has built-in barriers to access for some of the village entities then there is a danger of making separations and social stratification among people who have historical communal values. Jim Mitchell

(1998) writes about the wireless demonstration in Toksook Bay, a village on the Bering Sea coast:

> As with any new technology, it doesn't take long for the word to get out. Within a week, parents and community members came to me and asked how they could get onto the Internet from their homes, and if they could call in from their computers at work. I explained to them that the Wireless install, and the USF grants were dedicated to USF compliant organizations only, but that would be something to be considered in the future. Politically, and educationally, the greatest thing we could do for the village of Toksook and all villages in this region at this point in time, would be to begin thinking about the mechanism for tapping the community into the servers at the high school. If our purpose is to educate the children, many studies have shown that when computers enter the home, reading abilities of parents go up several grade levels, not just the children. An educated parent, means an educated child. In indigenous (and rural) populations that are in remote outposts like Toksook Bay, as well as all of the villages in the Lower Kuskokwim School District, access to the Internet will and has been shown to have a profound effect on the continued education of the out of school population.
>
> It is difficult to explain to someone how to ride a bicycle, when they have never seen one. The Internet is the bicycle which we must now open the shop and distribute to the community, so that they too, may learn to ride. The benefits of access to the community at large, either by multiplexed telephone lines into the school's LAN (Local Area Network) or Wireless boxes, should not be debated, nor ignored, for too long. I see this as the next step in "the last mile" discussions. The companies who have given us access to these new technologies at their own cost, have helped to prove that without using grant funds, we have provided testing of the technologies where they have never been thought to work before, either logistically, or cost effectively. These new and beneficial technologies will serve to benefit the educational community at large and other USF compliant organizations, and help to bring in the technologies of the future heretofore not available to remote access areas such as ours.

Common wisdom holds that the Internet obviates geography. On the Internet anyone can initiate communication with anyone at any time regardless of where they live. Cyber communities lack a geographical base. Our plan for a Village Area Network (VAN) is clearly geographically based. It is more akin to the electronic enhancement of traditional face-to-face instruction or computer support during collaborative decision-making in a shared environment than it is to disembodied interlocutors with a common goal who live in different places. The VAN creates a distributed Local Area Network (LAN) in the village, thus building community based on geography. The users of a VAN may well have heterogeneous goals, but they also have a common place. A well-

designed VAN can contribute important messaging characteristics like asynchronous threaded conferencing, archiving and posting of meeting records for members who cannot attend meetings, common access to updated local information with version controls, selectable anonymity to encourage forums for access to socially delicate information like safe sex practices, and communication between otherwise feuding extended families. In short, the VAN is an instance of the synthetic social context explicated by Madison and Aakhus (1994) as a means of conflict management in arenas with highly charged social identities.

We are concerned about the malleable features of a VAN created through existing wired infrastructure delivered by the regional telecommunications company for two reasons. First, the economics of the Delta suggest that providing Internet access to the major users in a village by a point-to-point dedicated line may be done in such a way that most other users in the village will not get access at all. Populations in Delta villages are not large enough to attract the interest of typical Internet Service Providers who presently sell access at the rate of $20 for unlimited connect time. Dedicated lines to a village far removed from microwave or overland lines require a satellite link. The cost of that link is upwards of $3500/ month for a 56k line. Not even the local high schools can afford those rates without 90% federal subsidies through the Universal Service Fund. Non-profit health clinics can get a subsidy to offset the high cost, but the subsidized rate is still out of reach. Local dial-up over existing local POTS loop at $90/month for 25 hours of 14.4kb speeds is barely affordable for the clinic, but such access is neither available in most villages at the present time nor upgradable to faster speed in the near future.

Second, a VAN that has each user connected via the internet to a distant server and then back to their village neighbors risks losing all connectivity when the Internet link is not available. We can expect that satellite outages, severe weather disabling local antennas, and local equipment failures will eliminate the Internet connection a significant amount of time during the first couple of years of operation. A viable local network served by a local node and accessible by a wide variety of community members will bring the advantages of community messaging, archiving of community information, and general community organization even when access to a server outside the village is down.

Our current proposal for the design of a VAN involves a consortium of users establishing a wireless cloud over a village utilizing unregulated spread spectrum wireless service. Rather than incur monthly line charges amounting to nearly $3,000 per year per user (monthly rate plus overtime usage fee), a one time equipment cost of about $2,000 per user can purchase a transceiver to attach to a computer. The robust technology uses indoor or very small outdoor antennas and connects at 1.5 mbps to 2.4 mbps speeds. There is a very clear technical advantage to the wireless solution. In the situation in Western Alaska, there are also two other factors. A federal technology infrastructure development grant has been already been secured by the Distance Delivery Consortium to purchase all the hardware for deployment, and, the Universal Service Fund will underwrite the cost of Internet connections for the school, library, clinic, and tribal government. Connection to the Internet is a definite possibility.

Since the Consortium has a mandate to support a healthy community for residents rather than a healthy bottom line for stockholders, the decision to provide user accounts to USF compliant organizations on the system will certainly be made on grounds other than the ability to pay. Once the equipment is installed there are no recurring charges.

Unfortunate Side Effects

Just when the imminent creation of Village Area Networks is poised to bring the Delta Internet access with all its community building potential, the regional telecommunication local exchange carrier has decided to fight it. They are very worried about the intrusion of other long distance companies swooping into the Delta where they have had a mandated monopoly. They fear the loss of millions of dollars in current actual revenues and future potential revenues. Consequently, they have distanced themselves from the Consortium that has presented such a united effort over the past five years. Ad hominum attacks have surfaced in insidious ways seeking to undermine the credibility of all the wireless advocates. The telco company lawyer has made a special trip to Washington D.C. to advocate rescinding the $750,000 federal grant that will purchase wireless equipment. The underlying argument from the telco is that the well-being of this company which employs many Delta residents is more important than any Internet access. The counter argument is that increased telecommunications traffic will benefit the economy in general, as well as, the local telco eventually even if the short term effect is the loss of some revenue. Numerous attempts to bridge the widening gap have proved futile. It is ironic that the means to create new community communication channels may also create factions which destroy existing channels.

Unintended Consequences

There are no unintended consequences yet because the system has not been deployed. However, we can imagine that use of the system will not be universal. Some people in the village will not take part. Will this create a social stratification? Will there be an increased dissatisfaction with the local resources once the entire world is merely a few clicks away? If the resource is dependent on the Universal Service Fund for subsidy and the federal rules prevent for-profit enterprises from using the system, then we may find that the students in the school are learning the means to do electronic data exchange while at the same time their local store cannot get connected to its own suppliers. What message would that be regarding the viability of the village economy? How would the stratification of the community affect general community activities? The Internet is becoming a merchandizing medium. How desirable is that in a subsistence economy? The power of the Web to connect people separated by distance can also separate people connected by location.

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