

Project Purpose

The Problem

Alaskan communities face unique challenges in obtaining access to quality health services. The state is vast -- containing 586,412 square miles. A map of Alaska superimposed on a map of the lower 48 states would touch South Carolina, Mexico, California and the U.S.-Canadian border (Appendix E). Despite its vast size, the state has only about 12,200 miles of public roads – a number more akin to the transportation systems of much smaller states such as Vermont. In fact, Alaska rates 47th out of 50th in the nation for the number of road miles while ranking 1st out of 50 for overall land mass. The lack of connecting road systems results in 75% of Alaskan communities and 25% of Alaska residents being unconnected by road to a hospital. These communities must depend on other modes of transport, such as plane, boat, and snow machine to access basic medical services.

According to the 2000 U.S. Census, Alaska has the third smallest population in the nation with 626,932 residents. Although close to half of Alaska's population is concentrated in the Anchorage region, the State's largest metropolitan area, 25 percent of all Alaskans, and 46 percent of Alaska Natives, live in communities of less than 1,000 people. Access to health care in this terrain is hindered by the state's incredibly large and varied natural barriers. The state's weather conditions are legendary. Long and dark winters characterized by snow, ice, and temperatures reaching up to 70 degrees below zero make travel to health facilities difficult.

An FAA study found that residents in 201 isolated villages have no road access to a hospital and must travel an average of 147 miles one way for access to the next level of medical care (Appendix F: Alaska Road Map). Not only are many patients and providers required to travel in order for patients to receive needed medical services, but that travel is much more expensive, treacherous and complicated than in most states. For example, travel between the village of Shaktoolik to Anchorage requires travel by single engine aircraft to Nome at a cost of \$285, and a scheduled jet flight out of Nome at a round trip cost of \$583. In emergency situations, travel expenses skyrocket. Medevac costs are much higher because they are provided via chartered aircraft outside of regular business hours. Many villages cannot be accessed at night because they lack lighted runways. There are 25 villages with no airport at all.

The Solution

Although little can be done to change the topography or climate of Alaska, telehealth solutions are an increasingly valuable method to help connect patients to health care providers. In order to increase access to health services (clinical care, medical education, conferences and meetings), ANTHC is developing an IP videoconferencing system (RAVEN). This system will enable applications such as telepsychiatry, tele-physical therapy, continuing medical education, and emergency consultation.

Recently, a Physician in Kotzebue used videoconferencing technology to perform a life-saving surgery with the guidance of an Anchorage specialist (see Appendix G). While not all uses of this system will be this dramatic, it shows the technology has greatly enhanced access to care and has the ability to continue to improve the way care is provided. This project aims to develop a system that will allow these types of consults to happen whenever needed from wherever needed.

A few health facilities on the network have some sort of videoconferencing equipment, but it is not used to near its full potential. Because these health facilities are each managed by separate tribal health organizations, each has its own IT department, policies and procedures, and goals. This project seeks to pull together the existing IT resources of these organizations and to collaboratively develop a standards-based, statewide system that interconnects multiple private healthcare networks so that videoconferencing can increase access to health services.

RAVEN aims to:

- expand the features of an existing Multipoint Conference Unit (MCU) that is currently located at the network core in Anchorage and managed by ANTHC staff
- develop and implement a standard dialing and addressing plan
- develop and implement policies and procedures for the use of the system
- research and implement easy-to-use software that will allow for a secure, usable videoconferencing network.

The system will take advantage of a secure, private healthcare wide area network (see Appendices H, I for network diagrams) that touches 160 Alaska healthcare facilities (and will grow to serve the remaining 40 tribal sites over the next few years). This WAN was put in place as part of the Alaska Federal Health Care Access Network project and is currently used for store and forward telemedicine, teleradiology, telepharmacy, and other applications. Because the network is used primarily for store and forward technologies, there is plenty of excess capacity. The plan to further develop videoconferencing comes from the recognition that current asynchronous telemedicine solutions do not meet all of the clinical needs identified by Alaska clinicians. See Appendix J for a logical diagram of the proposed videoconferencing system.

Outcomes

RAVEN will impact the delivery of health services to rural Alaska in many ways. The centralized, managed videoconferencing system will allow health providers to easily schedule face-to-face meetings, clinical consults, and educational presentations through an automated scheduling system. Currently, patients, providers, and staff often travel to provide or receive services and to attend meetings. The system will increase the ease, access to and frequency of clinical consultations between tertiary care specialists and rural clinicians throughout Alaska. Currently at the Alaska Native Medical Center (ANMC), videoconferencing is used an average of twice weekly. After implementation of Project RAVEN, we anticipate system use will not only consistently increase over time, but will also become intrinsic to the delivering health services within the AHS.

A coordinated system for videoconferencing also represents an entirely new venue for support of health services in rural Alaska, and its applications, outcomes and benefits are numerous. RAVEN will also provide low-cost access to medical education for remote clinicians. A well-managed and easily accessed statewide videoconferencing system will mitigate barriers to maintaining rural medical staff by providing access to timely, relevant and low cost Continuing Medical Education (CME) and by greatly increasing opportunities for peer and professional interactions, which reduce personal and professional isolation. Numerous other applications will support the AHS, including utilization of videoconferencing in clinical internship and Community Health Aide programs, and dissemination of prevention programs aimed at both AHS staff and AHS beneficiaries and communities. Training programs that

typically require travel to Anchorage can be held via videoconference. Cost savings obtained through use of videoconferencing become resources for enhanced services.

Our Goals are to: 1) create a centrally-managed system that is easy-to-use; 2) manage the system so that it is always available and always delivers high-quality audio and video; 3) achieve cost savings for ANTHC and members of the ATHS and 4) to bring care closer to home so that patients do not have to have to leave their families.

Innovation

Videoconferencing is not a new technology, but the use of videoconferencing in some of the most remote areas in the country for improved medical services is a new application of this technology. Many of the villages and towns involved in this project do not have access to the Internet, and have limited knowledge of computers and technology. The lack of infrastructure is not limited to just technological infrastructure. Many of the villages in the ATHS are so remote that they lack basic services like water and sewer systems. Enhancing village providers' access to videoconferencing will bridge enormous geographic distances and will complement the clinical guidance and support available to Community Health Aides and their patients. Adding videoconferencing to the very limited number of tools available for supporting village-based medical care is much needed. In addition to directly supporting the delivery of medical care, another innovative use videoconferencing in rural Alaska will be its potential uses for reducing professional isolation of medical providers, and ultimately impacting staff turnover. RAVEN will increase interaction among healthcare professionals by doing virtual grand rounds, clinical directors meetings, and other collaborations between rural and urban health professionals.

In addition to beneficiaries of the ATHS, RAVEN can also be accessed by agencies that serve other federal beneficiaries in Alaska, including the Coast Guard, Air Force, Army, and Veterans Administration. These agencies voluntarily formed the Alaska Federal Health Care Partnership (AFHCP) in 1997. Along with the Indian Health Service and the ANTHC, the federal partners continue to work together to improve services, save costs, and support each other. This innovative partnership has spawned the current AFHCAN store and forward, and teleradiology projects. The videoconferencing capabilities developed by this grant will also be made available to our AFHCP partners.

Application by ANTHC under the Technology Opportunities Program to develop statewide videoconferencing capacity is consistent with the agency's purpose and role within the larger system. The mission of ANTHC is to provide the highest quality health services for all Alaska Natives. Facilitating development of technical systems that support service delivery and service expansion is a central function of ANTHC. However, while the initial scope of videoconference development is the ATHS, followed by other federal partners, the system developed under this program will be the foundation for a new service line, whereby ANTHC and its ATHS partners eventually sell access to this system to private parties throughout Alaska. Many private sector providers are watching development of this system and will likely be willing to pay to use RAVEN to provide care in rural Alaska. Proceeds that exceed system maintenance costs would flow back into service delivery enhancements.

Community Involvement

Partners in the ATHS have long histories of successful collaboration. Alaska's unique challenges have required that ANTHC be innovative in solutions it develops. In all matters, ANTHC works with its ATHS partners to gather input from multiple communities and

organizations. The AHS consists of a mosaic composed of hospitals, health centers, clinics, and numerous community based programs. The AHS is made up of seven tribally operated hospitals and twenty-one tribally operated health centers in Alaska. In addition to these there are over 160 tribally operated village clinics with over 500 Community Health Aides or Practitioners delivering health care to Alaska Natives.

ANTHC is one of the 39 individual, autonomous tribal health organizations that have operated their own health services for ten years, but ANTHC's role in the AHS is unique. ANTHC has assumed responsibility for certain essential statewide services and functions. Technically, each tribal health organization in the AHS can choose how it will utilize its resources, and what system(s) to invest in. The ability to do this is the essence of why tribes and tribal organizations seek ownership of their healthcare from the federal government. With tribal self-governance as the backdrop, ANTHC's role is to help maintain the components of the system that are working and/or improve the components that are not; to work with system participants to facilitate the alignment of IT infrastructure rather than allow it to fragment into individual systems. With the responsibility of this statewide function, ANTHC is the most appropriate organization in the AHS to coordinate the video conferencing planning and implementation process.

One of the unique management features of ANTHC is the membership of the ANTHC Board of Directors. Members are elected to serve on the ANTHC Board by their respective regional health organization boards that operate the health delivery organizations. Board members of the regional health organizations are elected by local village councils and health boards within each geographic region of Alaska. Therefore, the boards of all Alaska Native health delivery organizations are elected by their respective constituencies. Likewise, the ANTHC Board of Directors is consumer operated and driven.

RAVEN is based not only on the needs of tribal health beneficiaries, but *all* federal beneficiaries in Alaska. Through the AFHCP, ANTHC will collaboratively design a system that addresses the needs of other programs serving federal beneficiaries.

The statewide network ANTHC manages was developed as part of the AFHCAN telemedicine project. Representatives from 39 tribal health organizations worked collaboratively to develop the appropriate technologies for use throughout the state. This discussion continues today in many different ways. The concepts described in this proposal are based on feedback from people in many different communities. Because RAVEN will connect the networks of several different organizations and communities and impact the residents of many communities, feedback will be continue to be gathered from them to develop, implement and sustain this project.

Support for End Users

ANTHC's Wide Area Networking Group supports the current telehealth network and works closely with IT staff at each of the participating tribal health organizations to support telehealth applications on the network. In addition to the substantial in-kind support by ANTHC WAN Group staff members, this project will require an additional employee to manage central videoconferencing infrastructure and assist remote users. Additionally, professional trainers will hold videoconferencing training in Anchorage for staff at remote tribal health organizations so that they can manage local equipment and provide hands-on support for remote users.

Perhaps more important than reacting to technical problems that may arise, the design of an easy-to-use system is critical to its success. ANTHC has worked extensively with clinicians,

administrators, and technical staff around the state to design other telehealth systems that are very user-friendly and appropriate for the user environment.

This videoconferencing system will include scheduling software and management software that allow components of the system to be remotely managed, schedule, and used. This integrated suite of tools will allow for centralized management and troubleshooting of resources and will allow users to quickly arrange conferences. Discussion at statewide clinical and IT committees – along with testing – has influenced the decision to standardize on equipment from Polycom. One major factor in this decision was the well-designed, simple user interface.

Stakeholder Involvement

As ANTHC has developed telehealth systems, much of the focus has been on store and forward technologies. ANTHC has now developed and deployed a state-of-the-art store and forward telemedicine solution (AFHCAN) in more than 200 sites around the state. As this system has matured and tribal health organizations have further developed their network infrastructure, many have expressed the need for more real-time applications such as telepsychiatry, continuing medical education, and emergency consultation. Many of the statewide telehealth committees have been discussing broadband video applications and implementing pilot projects during the past few years. ANTHC has recognized this need and has been developing systems and plans to address these needs by implementing a statewide videoconferencing system.

ATHS customers are also the owners of the system. The tribes that manage the systems that deliver care are all represented in the governance of ANTHC. Their wisdom and insight are key to developing health services that are not only effective, but culturally relevant and appropriate for the areas served. The stakeholders in this project are the tribal health organizations. ANTHC has worked with them and will continue to work with them to make sure that all systems are well-designed and well-managed. RAVEN will include a series of meetings and discussions with clinical, administrative and technical staff from the tribal health organizations to make sure this service meets their needs and integrates well with their healthcare delivery models.

Evaluation

ANTHC has developed systems to measure usage of the telehealth network (bandwidth, availability, support issues) and is working to incorporate this data into the development of new services such as videoconferencing. As RAVEN is developed, a primary goal will be to incorporate the gathering of usage data into the system design so that proper evaluation can be accomplished. A professional evaluator will be involved at the project outset to make sure that the data required for effective evaluation are incorporated into the system design. In addition to measuring usage, clinicians and professional evaluators will be involved in efforts to measure the clinical impacts of the technology deployed and to plan for expansion and improvements. WAN staff will survey clinicians about how they will use RAVEN, how often, and what type of support they will require. Follow-up surveying will be done after the system has been implemented to see if it is meeting clinical needs as anticipated. Improvements to and expansion of RAVEN will be based primarily on the results of these surveys.

Project Feasibility

Technical Approach

The focus of this approach is to create a system for videoconferencing that uses already-deployed videoconferencing equipment and an existing statewide telehealth network. The statewide telehealth network interconnects the networks of several tribal health organizations using T1 and fractional T1 connectivity between Anchorage and outlying sites. The network interconnects with each site via a Cisco edge router, which along with the core network infrastructure is managed by ANTHC.

RAVEN will also take advantage of a Polycom MGC-50 Multipoint Conferencing Unit located in Anchorage. This MCU is owned and managed by ANTHC. Some of the tribal health organizations already own Polycom video endpoints (typically Viewstation 128, FX, and Via Video Models) that are able to connect to the MCU via the statewide IP network. ANTHC WAN staff will work closely with the IT departments of the regional hospitals and clinics to further develop standards for IP addressing, quality of service, endpoint management and firmware levels, and policy/procedure development for system use.

This approach is based on the existence of an IP network, the existence of the MCU, and the fact that other transport options (e.g.: ISDN) are not available in most Alaska communities. The development of the networking infrastructure and purchase of video gear was primarily based on input and technical evaluation of a committee of healthcare IT leaders from around the state who have met regularly during the past several years to discuss telehealth issues. Network design issues (in particular, the choice to use private line and frame relay technologies) were heavily influenced by the availability of federal funding assistance from the Universal Services Administrative Corporation's Rural Health Care Division (USAC/RHCD).

Each of the regional hospitals has dedicated IT staff who work closely with ANTHC and vendors to ensure their technology is kept up to date. The system will include remote management capabilities as well, so that ANTHC network staff can assist IT staff in remote areas.

While RAVEN takes advantage of existing software, hardware, and staff, there is a need for more of each of these components to meet the project goals. In order to interconnect with outside networks to provide specialty consults, continuing education, or training, RAVEN plans to install an ISDN gateway. Because ISDN is available in Anchorage, RAVEN will enable rural organizations to use their existing IP networks to interconnect with virtually anyone, anywhere.

RAVEN will also include H323 "gatekeeper" software, which will allow the network to interconnect with other networks, and make efficient use of network resources. Some ATHS organizations already have their own videoconferencing networks. A gatekeeper will allow these networks to interface in a secure, standards-based manner.

RAVEN will hire a full-time videoconferencing coordinator. This employee will coordinate statewide videoconferencing efforts and provide technical assistance to ATHS organizations. ANTHC does not currently have a full time position dedicated to videoconferencing. This employee will also be responsible for tracking system utilization, and developing solutions that meets the growing needs of the ATHS.

Polycom products like GSM, Path Navigator, and MGC Manager are going to be used to manage systems. Standardization on Polycom and Cisco hardware has allowed staff to focus training efforts on just a few vendors' equipment.

As Alaska’s technological infrastructure has advanced, the demand for scaleable, flexible systems has risen. ANTHC has designed its existing telehealth network to meet many different needs and to expand as the needs expand. It is anticipated that interest in videoconferencing will expand rapidly as soon as this system is in place. Several organizations are seeking grants and researching video applications. Most of the networking equipment in place right now on the telehealth network is highly configurable and expandable (e.g.: routers have spare slots for additional interfacing and increased bandwidth, router memory can be upgraded, and the MCU has several spare slots so that more simultaneous conferences can be held.)

There are other entities outside of the existing network that could interconnect sometime in the future. These mainly include both private sector and public sector healthcare providers both inside and outside of Alaska. These groups are all participants in the Alaska Telehealth Advisory Council. This group meets regularly and has been a forum for discussion of technical standards and integration of telehealth services throughout the state. Additionally, ANTHC has taken great care to develop systems that are based on industry standards and to maintain vendor neutrality so that systems can take advantage of the “best of breed” equipment and so that they are inter-operable.

Applicant Qualifications

ANTHC has a proven ability to manage healthcare services in some of the most remote areas of the country. Providing high-quality services to a geographically diverse state is strength of ANTHC and has driven the organization to gather highly talented professionals who are leaders in their fields. ANTHC has managed several successful telehealth projects – most notably the AFHCAN store and forward telemedicine project, which has supported more than 10,000 cases in the past four years. ANTHC’s networking staff was originally hired to build a network for the AFHCAN project. This staff of three has more than twenty years combined experience in IT management – much of it in rural Alaska healthcare networks. The staff has obtained a number of Cisco and Microsoft certifications including:

- Cisco Certified Network Associate
- Cisco Certified Network Professional
- Cisco Certified Security Professional
- Microsoft Certified Professional
- Microsoft Certified Systems Engineer

Additionally, the team’s experience is backed up by a professional helpdesk that specializes in dealing with telehealth issues. Members of each of these teams have lived in and worked in Alaska for several years and have a thorough understanding of the state’s unique telecommunications infrastructure and the challenges it presents (see Appendix K for staff biographical information).

Project Implementation and Completion

The project will take 36 months to complete. The major milestones of the project are shown in a timeline (Appendix L). The project overview is as follows:

Year 1/Phase 1
- Plan
- Design System

- Select Equipment
- Define goals, metrics
- develop evaluation tools, strategies

- choose partners
- assemble team, governance
- purchase equipment
- Hire staff
- develop policy/procedure/standards

Year 2/Phase 2

- Beta testing (refine policy, procedure, standards)
- implementation

- initial evaluation
- business model creation
- expand user base
- begin fee-for-service model

Year 3/Phase 3

- “production mode”
- evaluate business, technical feasibility, sustainability
- evaluate and report success
- begin planning for future efforts/expansion

Privacy and Security

The ANTHC WAN is a highly secure private network. All traffic is monitored and logged to centralized systems. This data is reviewed daily by skilled technicians for any security breaches. Regular external security audits are performed on the network to validate the effectiveness of security measures. Security policy and procedures are already in place to maintain privacy and security in accordance with the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

All ANTHC WAN routers are equipped with hardware encryption modules that support 3DES encryption – ensuring that patient data is kept safe while in transit. ANTHC’s WAN Group works with partnering organizations on local area network designs that are secure and meet industry and federal standards. Additionally, the WAN Group seeks continuous training through courses, periodicals, and vendor security bulletins to make sure the network remains secure.

Sustainability

The RAVEN sustainability plan calls for participants to share in the ongoing costs associated with the videoconferencing network. A fee-for-services model will be developed during the grant period. This model will be based upon commonly used models in the private sector for selling network and videoconferencing services. This model is being driven by the emerging ANTHC service model which will allow remote tribes to contract for services with different departments at ANTHC on an as-needed basis for IT support, billing support, videoconferencing, temporary staffing, and other services. Because some of the services provided via RAVEN can be reimbursed by private insurance and/or federal payers, it is anticipated that tribal health organizations will begin to see revenue from this system during the grant period and a fee-for service model will be established during Phase 3 of the project.

Dissemination

ANTHC staff attend a number of conferences and have published articles in a number of healthcare journals. Once a final evaluation report is produced, ANTHC staff will speak at conferences, share the information with all participants, and seek press attention to the successes of the project. Additionally, the lessons learned from RAVEN will be shared with other healthcare organizations and systems and be made publicly available.