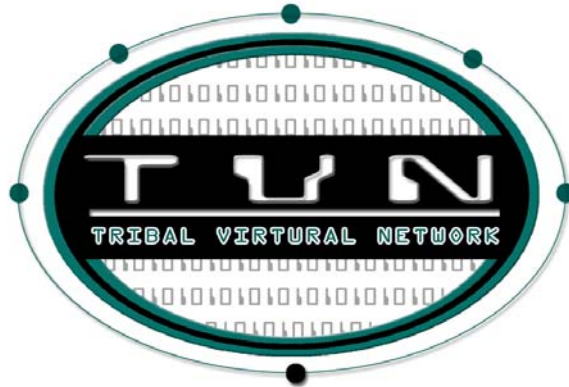


Communities Collaborating to Bridge the Digital Divide: The Tribal Virtual Network



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Abstract

The Digital Divide has become a catch phrase and political banner that defines the divide between the “have and have-nots” of internet-based technologies.¹ Many rural and Native American communities often have little or no access to basic Internet service, let alone high or even low bandwidth connectivity. A consortium of five tribal museums, culture centers and education programs in New Mexico have entered into a partnership to develop and implement a project that provides a solution to rural communities that lack infrastructure and connectivity. The five sites (the Pueblos of Jemez, Pojoaque, Zuni, the Indian Pueblo Culture Center, and the Jicarilla Apache Nation), located throughout northern and north central New Mexico, are using Access Grid technology that uses a low bandwidth solution (less than 1.5 megabits). The Tribal Virtual Network or TVN has been funded by a grant from the Department of Commerce. With their support and the support of the University of New Mexico’s Arts of the Americas Institute the Tribal Virtual Network is exploring different ways to use AG technology to benefit their communities. Some of the initiatives include accessing long distance education and training, facilitating communication and virtual meetings, developing innovative exchange programs, and participating with other AG-enabled platforms.²

¹ Bentonfoundation.org

² unm.edu/~aaiinfo

The Tribal Virtual Network and the Access Grid

Native American communities are grappling with issues that are central to their cultural survival and continuity. In the new millennium many Tribes are actively exercising their powers as Sovereign Nations in an attempt to ensure cultural sustainability for future generations in a world dominated by U.S. hegemony. Many Native American tribes are taking a pro-active posture in maintaining their cultural heritage and indigenous languages. However, our tribal communities are often in remote reservation locations, and unconnected to larger mainstream support systems. We are neither networked between ourselves or to the larger digital arena. A consortium of five New Mexico tribes have joined forces to develop a tribal Access grid, now known as the Tribal Virtual Network.

During a two-year period (1999-2001) five tribal entities met and developed a blueprint that would provide them access to the larger AG-enabled environments. The tribes included the Jicarilla Apache Nation, the Pueblos of Zuni, Pojoaque, Jemez, and the Indian Pueblo Culture Center. The four main needs that the consortium identified included: 1) connectivity; 2) equipment; 3) staff; and 4) training. UNM's Arts of the Americas Institute worked with the five tribes on a grant to the Department of Commerce's Technology Opportunities Program, which was funded to cover expenses related to connectivity, equipment, staff and training. The grant period runs from 2001-2004, and we are mid-way through the grant.

The TVN Consortium's solution was to establish a Tribal Access Grid – the Tribal Virtual Network. The TVN/Access Grid provides networked telecommunications access to each of the five consortium members using an affordable low-bandwidth solution. The TVN/Access Grid is modeled on the innovative National Computational Science Alliance (NCSA) Access Grid, popularly known as the AG. The TVN/Access Grid is intended to serve as a national model for Native tribal and other rural communities. The TVN/AG: **a)** illustrates how Tribes can use and develop educational programs based on emerging low bandwidth solution to connectivity (1.5 kbps); **b)** provide the means to retain cultural integrity utilizing these emerging technologies, and **c)** demonstrate the value of partnerships with technology and University research institutes. Partnerships between isolated and rural communities are an effective means to pool resources and achieve larger goals. One of the main aspects of this model is that the Tribes themselves develop their programs according to their own culturally appropriate guidelines – a new phenomenon called cyber sovereignty. Setting up community access computer labs at each of the Tribal cultural centers constructs the foundation on which Cyber Sovereignty can be built.³ The unique model we have developed is based upon a Native American organizational structure which is not hierarchical in nature, but based on group consensus and agreement. This is a decentralized and horizontal model that has worked well with a partnership that includes five different sovereign nations and a research University.

³ Cyber-Sovereignty a term coined by UNM Ph.D candidate Fiona Sinclair defines the foundation of the TVN project – that decisions are made and implemented by the five tribal members. and then exchanged between the Tribes through the Access Grid.

Indian Pueblo Culture Center



The Indian Pueblo Cultural Center has been owned and operated by all Nineteen Pueblos of New Mexico for over twenty-five years. Since its inception, the goal for the Indian Pueblo Cultural Center was to provide education regarding Pueblo Indian history and culture to all age groups via many different educational delivery models. Some of these have been implemented and are now coming to fruition. The Indian Pueblo Cultural Center Museum the only museum in the country that traces the history of the Pueblo people back to the Pre-Columbian era; the Pueblo House hands-on children's museum that introduces children to many aspects of traditional daily pueblo life; the cultural education program that provides for dance performances and crafts demonstrations; and the Institute of Pueblo Indian Studies (archives and research library). Other educational delivery models are moving toward reality.

Located in the heart of Albuquerque, New Mexico the Indian Pueblo Cultural Center provides a centralized location through which many people can access, via the access grid, the more remote locations of its consortium partners. The Indian Pueblo Cultural Center's main goal for the use of the Tribal Virtual Network (TVN) Access Grid is to provide a centralized venue for access grid meetings and develop lecture and educational programs that can be presented through the access grid. The Indian Pueblo Cultural Center is in the process on constructing a new visitor's center. Within this center the Indian Pueblo Cultural Center intends to enhance the access grid with additional nodes and the AG will become a vital tool in achieving these goals by providing a network that allows distant tribal nations to access the resources developed by the IPCC.

Pueblo of Zuni



Connection to the Access Grid through the TVN project holds great promise for Zuni Pueblo, a rural community of 10,000 located in far northwestern New Mexico - twelve miles from the Arizona state line and 169 miles from Albuquerque. Remoteness has long been factor of Zuni life, however, modern technology offers the opportunity to both continue a rural lifestyle while benefiting from connections with the larger world. TVN in Zuni addresses both cultural and administrative needs as well as

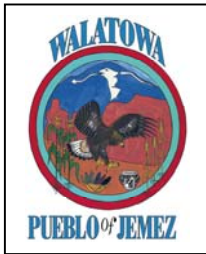
offers important potential economic benefits for this community of artists. A recently opened major local exhibit - Hawikku: Echoes from Our Past - anticipates utilizing expanded connectivity to enhance its public programming. The exhibit explores Zuni history and culture from the perspective of this ancestral village, which was the site of first European contact with Native Peoples in the Southwest. Broad bandwidth access to the resources of the Smithsonian National Museum of the American Indian (NMAI) opens these artifact collections and information databases to anyone in the community. The Access Grid will enable in-depth presentations as well as distance learning about topics emerging from the Hawikku exhibit. Virtual tours of the exhibit as well as to the Hawikku archaeological site (currently off-limits for visitation) will greatly expand the impact of the exhibit.

Zuni Tribal Administration has been central to realizing the Zuni TVN project and in turn sees the project as greatly expanding services for the community. Tribal Government as well as community agencies will benefit from AG video conferencing through immediate dialog with other regional and national entities. Such capabilities are of great value when time conflicts with traditional religious or cultural obligations occur. Eventually, Tribal programs linked via microwave connections will be able to fully benefit from the expanded capabilities of the TVN and AG. Planning is underway to enable broader community access and benefit from the local network.

Great potential exists for the use of the AG by artists for both personal research and enrichment as well as for economic promotion. Arts workshops might explore new techniques and art forms or feature the business aspects of arts production. Historic artifacts from the NMAI and other collections can be virtually researched by artists seeking to resurrect long-lost designs and forms. The AG might even serve as a virtual marketplace to open new venues for the promotion and sale of art works. In a community such as Zuni where the main "industry" is arts production - but unfortunately where most customers are distant, the potential for expanded markets and sales represents important economic benefit and growth for the community.

In sum, the TVN and AG represent effective tools for significant cultural, community and economic benefit for people of Zuni Pueblo. However, the benefits represented by this new technology are not meant to provide unfair advantage for Zuni's residents but rather to "level the playing field" to enable Zunis to benefit from advantages enjoyed by much of the urban world.

Pueblo of Jemez



The Pueblo of Jemez, known as Walatowa in our Jemez language, is located in North Central New Mexico, approximately 50 miles northwest of Albuquerque. Encompassing over 89,000 mountainous acres in area, the village of Walatowa is home to 3,400 tribal members. Jemez is a sovereign nation with an independent government and tribal court system. The secular Tribal Government includes the Tribal Council, the Jemez Governor, two Lieutenant Governors, two Fiscales, and a Sheriff. The 2nd Lieutenant Governor also serves as the Governor of the Pueblo of Pecos. The Pecos people integrated into Jemez society in 1838, and still are honorably recognized through the annual appointment of the Pecos Governor, who also serves as one of the Lieutenant Governors.

Traditional matters are still handled through a separate governing body that is rooted in prehistory. This traditional government includes the spiritual and society leaders, a War Captain, and a Lieutenant War Captain. All positions are appointed to one-year terms by the cacique, the highest religious leader. The Tribal Council is composed of all the former governors who serve life terms. There is also a tribal administrator and other professional staff who provide continuity from one administration to the next.

Our people cherish our Jemez ancestral traditions, and are proud to integrate their culture with modern society and today's technology. Today, many Jemez people are internationally known for their arts and crafts. Pottery such as bowls, seed pots, sgraffito vessels (elaborately polished and engraved), wedding vases, figurines, holiday ornaments, and storytellers are now in collections throughout the world. Jemez artisans also create beautiful basketry, embroidery, woven cloths, exquisite stone sculptures, moccasins and jewelry. Our people are also known as "runners," many of whom still hold unbroken records at major national events, and new generations who continue to set new records in cross-country, track and field competition. Jemez is viewed as a pioneer in Native Education throughout New Mexico. We have a department that is growing at a steady rate and we are opening a second Charter School on the reservation this fall. New Mexico has only two Native charter schools, both which are located in Jemez. We pride ourselves in our efforts to "redefine education" for our tribal and community members.

Throughout the course of our history, Jemez has faced enormous challenges and has continually found ways to adapt and survive. Today, Jemez is a growing and thriving community that is setting the trend in many areas of tribal program development, educational initiatives, and tribal government. The main employment opportunities within the tribe are provided through the Tribal Administration and its departments, local schools and small businesses – although the majority of Tribal members continue to

commute to jobs in Albuquerque, Santa Fe, Bernalillo and Los Alamos, an average of 120 miles round trip. Through perseverance, our Jemez people have managed to preserve our traditional culture, religion, and knowledge of the ancient traditional ways regardless of outside pressures. Thus many of our tribal members supplement their living with traditional arts & crafts, small farming and livestock operations.

The Pueblo of Jemez Department of Education provides comprehensive educational services for tribal members and local communities in the Jemez Valley corridor, from the age of 6 months to adults. The department consists of four main program areas: The Early Childhood Programs, The Higher Education Center, Jemez Community Library and Walatowa High School. The department staff is nearing 40 and we continue to grow and expand as we create unique and dynamic opportunities for all our tribal and community members.

The Tribal Virtual Network is operated through our Higher Education Center. The Jemez Higher Education Center was established to provide quality educational programs and opportunities to all members of the Pueblo of Jemez, as well as to assist students in obtaining relevant information with respect to their individual educational needs. The center has a focus geared towards meeting the needs of our middle school, high school, college students and adults who wish to attain higher education. The centers primary function is to serve as a support center from which students are able to access a multitude of services in the educational arena. The overall program goal is to enable students to achieve post secondary academic success with the intention of giving back to our community. We have many resources for young adults as well as adults seeking to further their own education.

With the creation of the Tribal Virtual Network (TVN), we have launched a virtual Creative Learning Center as yet another student support program and community resource. Our TVN project is aimed at creating a digital access grid that will establish and connect our computer laboratory with area tribes along with colleges and universities worldwide using broadband Internet connections. The project will enable our Creative Learning Center to provide access to long distance education, cultural education programs, e-commerce capabilities and web-based exhibitions and databases.

TVN Program Goal: To establish a virtual Creative Learning Center that promotes lifelong learning through academics, cultural education, traditional knowledge, enrichment programs and economic viability. This will occur through the use of advanced technological capabilities and unique partnerships.

- Plans for the TVN/ Access Grid is to create a well established and advanced distance learning program using high speed bandwidth and build on existing partnerships and collaborations with universities;
- Expand and establish NEW enrichment programs and opportunities via the Internet, utilizing advanced technology for all age levels;

- Work with the Jemez Tourism Program and the Culture Committee to develop and create a historical video on Walatowa, its people, history and culture to be shown at the Walatowa Visitor's Center. Also create a distance learning program geared towards traditional artists in providing programs in museum studies, professional artist development, technical training, and eventually develop an avenue for E-Commerce;
- Explore the possibilities of setting our TVN site up as an Internet Service Provider (ISP) for the residents of the Jemez Valley corridor. Currently the only Internet availability existing in the valley is on a 56K Dial-up connection.

Jicarilla Apache Culture Center



The Jicarilla Apache Culture Center is located in Dulce, New Mexico, the heart of the Jicarilla Apache Reservation and 193 miles from Albuquerque. With the TVN/Access Grid, the Culture Center has begun using the technology to record and archive photographs from the Denver Museum of Nature and Science and the Photo Archives from the Museum of New Mexico. In addition to the photo archives, the Center plans to create a virtual collection of Native American Graves Protection and Repatriation Act (NAGPRA) objects. This Act of Congress passed in 1990 compelled public museums to return human remains and associated funerary objects. Due to the tribal taboos surrounding death and property, these objects cannot be repatriated directly to the Jicarilla Apache Reservation. Instead, the Nation has determined that the collection can be recorded and archived in the virtual realm that will be accessible only to tribal members.

Together with the virtual collections, the Center is developing educational programs. The Jicarilla Apache dictionary will be completed in November 2003 and available in the virtual realm. Furthermore, the Center is formalizing plans to establish a Jicarilla Apache Heritage Center. This new Center will operate a small museum, arts and crafts gift shop and office. With Internet access and on-line capabilities, the Center is presently building its own tribally-controlled e-commerce trade with an educational component. In these ways, Jicarilla Apache artisans benefit in an otherwise impoverished economy that lacks alternate employment opportunities.

The Jicarilla Apache Culture Center was established in 1997 with a mission to preserve the Jicarilla Apache traditions and culture. The education of Jicarilla Apache member is its foremost concern. The Center strives to develop programs that will teach youth about the history of the Jicarilla and provide a pragmatic approach to teaching of traditional skill techniques and craftsmanship.

Pueblo of Pojoaque Poeh Cultural Center and Museum



Pueblo of Pojoaque Tribal Council Resolution established the Poeh Cultural Center and Museum in 1987. The Poeh Center's mandate and mission is to preserve the Tewa Pueblo cultural arts for younger generations of Pueblo people. Poeh Arts and the Poeh Cultural Center and Museum are community based programs that routinely collaborate with surrounding communities to provide art education, curation, conservation, and related art and museum services. The Pueblo of Pojoaque is located 15 miles north of the state capitol of Santa Fe and 78 miles north of Albuquerque.

This access grid, formally known as the Tribal Virtual Network, connects all these centers with UNM to provide art instruction, allow the museum collections to be accessible on-line, and enhance networking and research capabilities. The TVN project paves the way for development and delivery of long-distance education, the exchange of virtual collections and other cultural information, e-commerce and web-based exhibitions and databases. The Access Grid will allow students in far reaches of the state to take courses from Poeh Arts in Pojoaque or exchange cultural information and virtual images of the artwork captured and stored in a database, which would include the traditional name of the piece and its cultural and historical context.

The development of e-commerce could create economic empowerment zones in communities that have traditionally relied only on the sale of goods in accessible local markets. Partner sites will house resources for mentoring and training, provide laboratories for creation of jobs and opportunities, and a means for the exchange of ideas and technologies between the arts and sciences. The hope is that empowering people, especially artists, through technology will reverse the drain of talented and innovative people from leaving their communities.

Technical Solutions

Due to the extreme remote locations of some of our tribal partners, obtaining T-1 lines for connectivity was a challenge. This is a common problem to Native communities throughout the U.S., and more specifically, the Southwest. This region is characterized by distance and a landscape that is not a viable environment for telecommunications companies to provide service.

We selected CHECS-net as the network provider based on the following criteria: they provide: 1) ISP services 2) I2 connectivity 3) A network for distance education 4) Network support 5) MAGnet discounted prices. CHECS-net, the Council for Higher Education/Communications Services (CHECS), a not-for-profit corporation in New Mexico whose members are professionals from the computing services divisions in every institution of higher education within New Mexico www.checs.net. CHECS-net uses

Qwest's statewide ATM which is a robust network with .001% latency. ATM does not have a mileage charge so service out of Las Cruces was not an issue.

TVN has goals for the program as a whole and these had to be met for the network decision. In general, these goals are the following: 1) Connect all the centers for collaboration and training, this is the network aspect 2) Ensure that each center has Internet connectivity at a level to meet their own objectives 3) With the network connectivity in place, along with the AG equipment, each center will have the capability to begin identifying and developing their own programs and projects (virtual classrooms, virtual exhibitions/tours/databases, e-commerce, community computer access hubs, etc.). This is the "cyber-sovereignty" component.

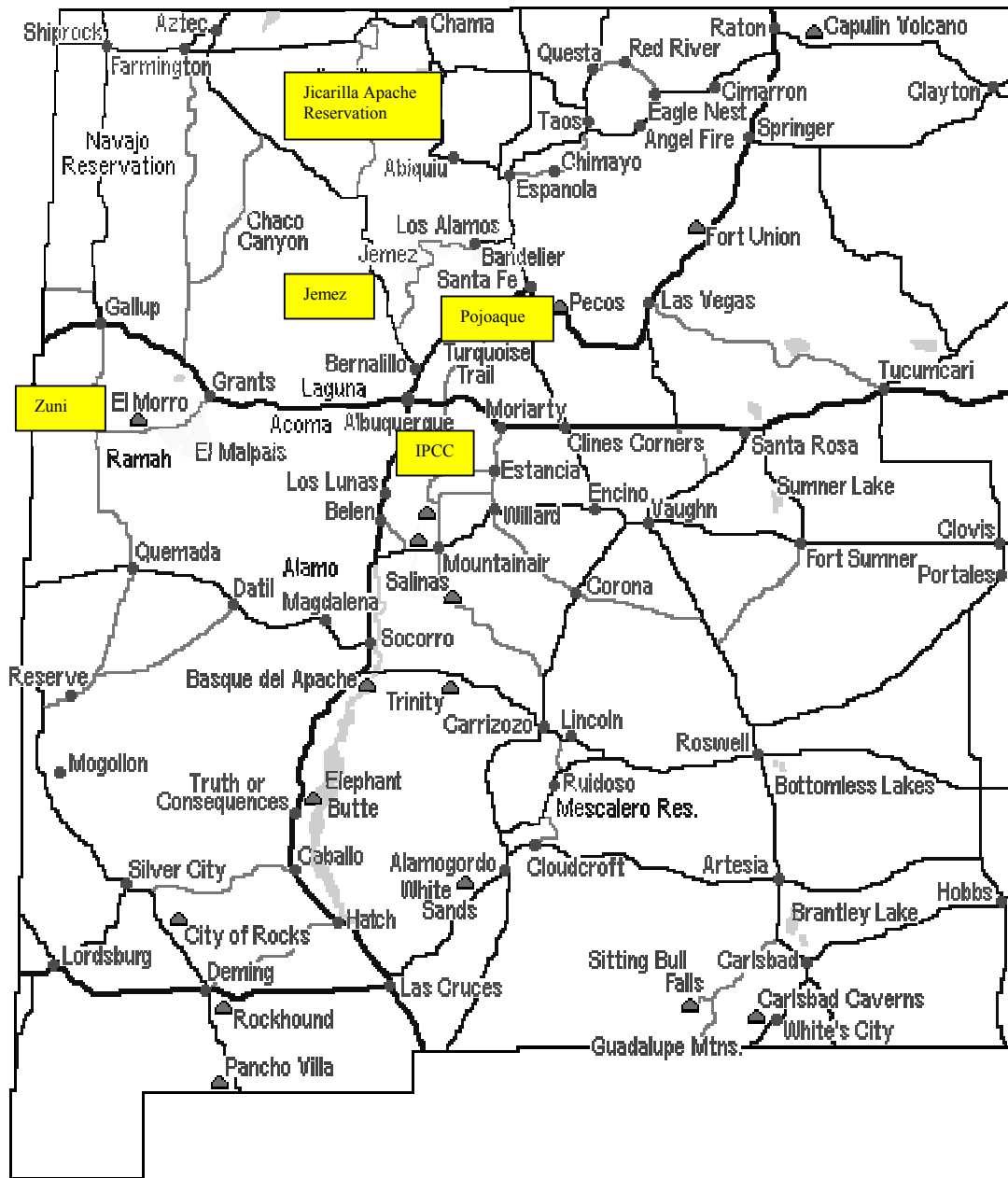
The network is hubbed at CHECS-net's facilities at New Mexico State University (NMSU) in Las Cruces, NM. CHECS-net is a single Point of Contact (POC) for network problems. The consortium members go directly to should they experience any problems. The reality has been that CHECS-net has notified us in advance that when there have been problems. CHECS-net also made the arrangements with the local exchange carriers and Qwest to get lines installed or changed.

CHECS-net uses MAGnet discounts on pricing. The State of New Mexico entered into an agreement with Qwest, our local phone company, in a program called MAGnet. MAGnet is a state of New Mexico initiative to provide connectivity to rural parts of the state at a discount.

Our access grid equipment was purchased from InSors as they specialize in low-bandwidth solutions www.insors.org.

New Mexico's Tribal Communities and an AG-enabled Platform

By sharing resources and working together the TVN consortium has established low bandwidth Internet access and an AG based platform. The TVN consortium will use the TVN/AG to: provide cultural information, such as exhibits of Native American art (both traditional and contemporary); develop language-retention programs; establish e-commerce as a viable economic alternative to the many artists that live in tribal communities; access long distance education and training programs. The better access Tribes have to information through advanced telecommunications infrastructure, the more effectively we will be enabled to control our own destinies, including but not limited to, cultural determinations, economic development, and political empowerment. Establishing the TVN/Access Grid will enhance development at a critical juncture in New Mexico's telecommunications evolution, and allow the state to move with comparable speed into the new millennium.



Mileage from Albuquerque

Pojoaque	78
Zuni	169
Jemez	44
Jicarilla	193

New Mexico Map showing TVN member locations