GILA AND PINAL COUNTIES

COMMUNITY TELECOM ASSESSMENT

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TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

The Arizona Partnership for the New Economy (APNE) was established to study Arizona's economic preparedness and make recommendations to improve the state's ability to compete in the global, technology-based economy. APNE identified the development of telecommunications infrastructure in small and rural communities as a top priority. The State of Arizona appropriated funds to the Department of Commerce to implement various recommendations of APNE. As a part of their implementation, they set up a Community Telecommunications Assessment program (CTA). The Department of Commerce encouraged regional applications for these CTA assistance grant funds. The State assistance was intended to enable small and rural Arizona communities to identify localized market-driven strategies to encourage private telecommunications providers to build out their network of telecommunications infrastructure and services or other means of providing access.

The Pinal/Gila Community Telecom Assessment (CTA) Partnership Project was one of the recipients of one of these CTA assistance grants from Department of Commerce (DOC) Rural Arizona Community Telecommunications Assessment (CTA) program. In July of 2003, The Pinal/Gila Community Telecommunications Assessment Partnership Project contracted for the preparation of this Community Telecommunications Assessment.

This CTA Report is intended to present an overview of the recent state of network technology development and use in both counties and to identify a variety of infrastructure development and funding options to accelerate the introduction of higher-bandwidth telecommunication services in both counties. However, in light of difficulties presented by the current economic environment, the plan is also structured to support creative incremental investments in extending and building improvements in telecommunications infrastructure.

This report has presented an overview of the current state of network infrastructure and uses in Pinal and Gila counties based on results of a survey process and other researches conducted from July to November of 2003. It also identifies both problematic and likely areas for infrastructure development and maps interest and demand for enhanced services for specific locations and the counties as a whole.

This report discovered two key large-scale infrastructure development possibilities, one in each county, which relate to county participation requirements in the Southern Arizona Communications Consortium Network (SACCNet):

1. Creation of a wireless or wireless and fiber optic network backbone between Florence and Casa Grande in Pinal County, ideally incorporating and extending existing the wireless ITV infrastructure of Central Arizona College (CAC) and the CAC-headquartered CAVIT vocational/technical school district and others;

2. Extension of San Carlos Apache Telecommunications Utility, Inc. (SCATCOM) fiber infrastructure into Globe, completing a link to SACCNet's aggregated broadband access resource for Gila County.

This report also suggests a number of smaller-scale activities (general and specific) that the Partnership can undertake to incrementally improve the telecommunications infrastructure in the both counties and in each community within the county. Upon determination of which of the recommended alternatives in this plan the County wishes to pursue, the County may generate grant funding proposals, publish an RFP (Request for Proposal) for vendors, evaluate responses, and make a contract award for the implementation of telecommunication infrastructure improvements detailed in this plan.

The report also points out the key importance of governance for any ongoing implementation of suggestions and ideas that may be adopted from this plan. Details for an elaborate governance structure are presented for reference.

2.0 THE ARIZONA STATE NETWORK

The quest for information technology efficiencies is a key issue for the Arizona Department of Administration's Arizona Telecommunications System (ATS). These efficiencies are listed as Strategic issue #2 in the ADOA Strategic Plan for FY 2004 - FY 2008:

> ***Problem:*** *Current thinking and action by public and private organizations envision that a single provider of data, voice, and video platforms is often the most cost-effective means of technology efficiency. It is imperative that opportunities to consolidate the delivery of technology support for business solutions and to provide outstanding service delivery be continuously explored and utilized whenever possible. [ADOA Strategic Plan FY 2004-Fy2008; p 9]*

In 2002, ADOA and the Government Information Technology Agency were required by House Bill 2706 to prepare a report examining a number of options, including privatization, centralization, and public-private partnerships to improve the efficiency and reduce the costs of the Arizona Telecommunications System. The task included reviewing State telecommunications options and submitting a plan to the Joint Legislative Budget Committee (JLBC) by November 1, 2002. All options developed were intended to improve service delivery and increase the fiscal efficiency of Arizona statewide telecommunications services. The report included the following brief network description and a schematic diagram [see Appendix L]:

> *In its role as the primary provider of voice and data telecommunications services to State agencies, ATS has evolved a physical architecture for service delivery that reflects the concentration of State agency headquarters and major offices in the Phoenix and Tucson areas. The Capitol Mall in central Phoenix and the State complex in downtown Tucson have State-owned conduits and fiber optic and copper cabling throughout each facility. The Phoenix Capitol Mall and Tucson Complex are tied together by a redundant inter-LATA (Local Access and Transport Area) high-speed OC-3 service leased from a major inter-exchange carrier. Additional leased circuits provide voice and data communications to many agency field offices throughout Arizona.*

The report characterized its recommendation as "a radical departure from the existing service delivery model." The report recommended that Arizona State Government should pursue either a Shared Service or Privatized service delivery model [detailed in the body of the report, found at http://www.ats.state.az.us/JLBCrpt/JLBC_Report.pdf]. An Alternative Privatization scenario, private ownership of assets, was favored by GITA; however, an ADOA cost evaluation contained in the body of the report concluded that the Privatized model appeared to offer more potential.

The report extensively researched the cost issues of privatization and presented the following three recommendations:

> *Arizona State Government Needs to:*
>
> - *Adopt a centralized governance model with strong executive authority and legislative involvement.*
>
> - *Depending on which method of privatization is selected, centralized telecommunications funding to leverage resources and gain greater accountability may be desirable.*
>
> - *Strongly consider the resources available in the private sector either through an outsource (leveraging the economies of scale available through the public/private partnership) or co-source (shared services) to improve efficiency, acquire expertise and ease the financial burden.*
>
> *[from the Executive Summary, Statewide Telecommunications Services; Report to: Joint Legislative Budget Committee - Arizona Telecommunications Services; November 2002; second printing.]*

The emphasis of the report on cost savings, rather than on targeting greater value for current levels of investment, bodes ill for the potential for State infrastructure investment generating collateral benefits such as accelerated broadband access for rural areas. Specifically, the report did not address the potential for the State to serve as "anchor tenant" in rural areas, leveraging its telecommunications infrastructure investment to the benefit of other local telecommunications service users, a strategy that has proved successful in other Qwest-served States, notably Colorado.

The ADOA Strategic plan further elaborates the need for consolidation and elimination of waste in the delivery of services:

> *It is the belief of ADOA that current approaches to telecommunications in particular, and to a lesser extent data technologies, consist of unnecessary duplication, overlap, and waste. We are in the process of working with the State agencies to identify opportunities for consolidation. Once potential opportunities are identified for increased cost effectiveness, it is critical that all potential solutions be thoroughly researched, analyzed, and compared to other business systems' needs prior to implementation. This type of comprehensive infrastructure should provide the highest level of quality and cost effectiveness, allow maximum return on the state's valuable resources, ensure effective, affordable state-of-the-art business solutions, and identify exceptions requiring unique business systems. . [ADOA Strategic Plan FY 2004-Fy2008; p 9]*

The potential in rural areas for shared infrastructure (down to the circuit level) is good news. Existing examples of service contracts and intergovernmental agreements (IGA's) between rural infrastructure projects and State agencies need to be expanded into a common "best practice.'

Conspicuously absent, however, is any mention of how collaboration with grassroots efforts such as the Southern Arizona Communications Consortium Network (SACCNet) can improve ATS service delivery.

Whatever direction ADOA takes with the further development of ATS, rural governments will need to make their case for enhanced service and bandwidth access away from the Phoenix to Tucson I-10 axis.

County and local governments should let their legislators know that "penny wise and pound foolish" cost efficiency concerns (*i.e.,* saving money rather than leveraging the existing level of investment) can further impede the synergy and collaboration that is necessary between state and local entities to ensure adequacy of rural infrastructure development. In particular, the rural communities should present a common message of the need to move beyond adequacy for the telecommunications infrastructure's effects on economic development, education, health care and public safety.

More information and current news can be found on the **Arizona Telecommunications System** (ATS) website at http://www.ats.state.az.us/.

3.0 THE COMMUNITY TELECOM ASSESSMENT PROJECT

The Department of Commerce for the State of Arizona recognized the crucial importance of information technology infrastructure and access to broadband technology to the economic viability and future of the more rural and remote counties in Arizona. With that in mind, the Department of Commerce created a funding pool for a competitive process that would provide grant funds for a limited number of those rural counties to undertake a detailed assessment of their specific telecommunications needs and opportunities. The competitive application process was conducted through the late summer/early fall of 2002 and a prioritized list of counties was announced in early 2003. A joint application from Gila and Pinal Counties was submitted in October, 2002 and designated as the number two priority grant recipient in the program.

The purpose of the Community Telecom Assessment was to ascertain the existing level of telecommunications demand and applications as well as to determine if potential future demand and applications were sufficient to warrant significant information technology infrastructure upgrade and/or deployment. The CTA included three distinct phases with reporting requirements for each phase:

Phase 1:

Needs Assessment - This part of the project included public meetings, one-on-one (or phone) interviews with representatives from local governments, health care sector, County and higher education institutions, business owners, and not-for- profit entities regarding current uses and applications for broadband access.

Surveys - Two separate survey instruments were developed, with local input that targeted residential consumers and business/government/not-for-profit technology users. Information derived from these surveys was critical in helping determine potential demand for broadband service.

Phase 2:

Infrastructure Inventory - This effort included an assessment of what current infrastructure capacity existed and what technology was available in what locations. It included exploring opportunities for DSL, cable, fiber optic, T-1, Frame Relay, ISDN, fixed wireless, satellite and 3rd Generation wireless (PCS picture phones, etc.). Also included was a detailed analysis of existing networks – LANs, WANs, video links, etc. and how much capacity existed within those networks.

Business Model - Information obtained from the Phase 1 Needs Assessment was incorporated into this phase which also examined population and household projections, business usage projections, industry statistics, market share assumptions and pricing assumptions. Those were components of a revenue-based model. Cost-based models were also examined during this phase, including those provided in Arizona's Telecommunications White Paper that was funded through another AZ Department of Commerce project.

Phase 3:

Technology Plan – Information obtained in both Phase 1 and Phase 2 was incorporated into a more detailed strategic plan for making more efficient use of existing network resources, as well as contemplating future investments in upgraded broadband infrastructure. This part of the report explores potential alternatives for various types of technology as well as potential strategies to fill existing gaps in the network. The discussion in this section includes recommendations for proceeding to the implementation phase.

Finance Alternatives – A comprehensive exploration of potential funding sources, including grants, is included as part of the Phase 3 efforts. Without a realistic methodology for funding a regional infrastructure initiative, the rest of the report becomes a fancy piece of shelf art. This aspect of the project is critical to ensuring an outcome-based implementation follow-through. Financing alternatives include a wide variety of approaches, and include a look at the potential benefits of public-private partnerships, joint ventures and publicly financed bond initiatives to support the deployment of advanced technology infrastructure across the Gila and Pinal County landscape. These recommendations are incorporated throughout the report, but an exhaustive section just on potential grant applications is included as a separate section.

4.0 VISION STATEMENT

The drafting of a vision or mission statement should be among the first tasks taken up by the governance group that meets to begin the continuity process for the Pinal-Gila County Telecommunications Partnership. The completed statement, which may be as short as a few sentences, will serve as a declaration of interdependence and focus for the ongoing operations of the group.

It should be kept in mind that one of the uses of the vision statement will be to explain or communicate the nature of the mutual aid and benefits sought by the Partnership. It may be necessary to follow the brief vision statement with a bulleted list of specific and categorical outcomes expected for participants in the Partnership.

The draft text should be reviewed and approved by appropriate political and managerial persons at participating organizations and this approval should be noted as part of the final vision statement itself.

An example of this style (statement followed by bulleted items) that was drafted by a community planning group in Logan County, Colorado, can be found in Appendix A.

5.0 GOVERNANCE PROCESS

5.1 COUNTY

[Note: The following elaborate description of a governance process is presented as a conceptual model. Actual ongoing governance for the Partnership may be a much more lean process and will be a matter of determining "what works," in what priority order and for whom.]

The Community Telecommunications Assessment (CTA) reported in this document was accomplished under the direction of the Pinal Gila Telecommunications Partnership, a committee comprised of member representatives from local governments, economic development offices, schools, and other stakeholder organizations. Active participation in meetings of the Partnership ranged from approximately 12 to 18 representatives.

The list of Partnership representatives who could potentially attend, or who receive e-mail or fax communications of meetings and minutes of the meetings number between three and four dozen. Continuity of the Partnership may mean that active meeting attendance may drop, while the number of organization representatives on a communication list may also be expected to increase.

To continue beyond the planning process into implementation of a plan or any of several activities recommended in the plan, the committee will have to refashion itself into a sustainable and productive form. Over the long term, such an organization will only be sustainable if it can return value to its participants. The Pinal Gila Telecommunications Partnership must define priorities and goals for near and long term efforts that will follow-up on the potential development possibilities presented in this report.

The governance process will require periodic meetings by representatives of major stakeholders (government, education, healthcare, economic development, etc.) in improving area Telecommunications infrastructure. Pinal County hired Lisa Bergeron with the title of IT Special Projects Administrator for duties including serving as the coordinator of the CTA process. After the planning process is completed, the Partnership will have to determine if this Pinal County staff support can be continued (and on what basis) or if a separate administrative chair of this group should be appointed to set meetings and distribute agendas and minutes.

Ideally, three committees (or one master committee and two subcommittees or work groups) should be formed to provide governance to the Pinal-Gila Telecommunications Partnership: 1) the project management committee; 2) an informal technical advisory subcommittee; and 3) a purchasing/legal/business process subcommittee. Each committee should meet at least twice a year, but preferably quarterly, in task-focused meetings. Other possible subgroups for periodic meetings may include a K-12/VOC ED/ Higher Ed special interest group, a grant writers group, and application oriented subgroups such as an IP VIDEO interest group or VOIP interest group.

The **project management committee** will oversee the planning process, grant application or other funding source development, issuance and evaluation of RFPs (if any), generation of group purchase agreements, and the scheduling and build-out of any large-scale infrastructure implementation. It should include as broad a base of stakeholder representation as possible, with representatives from higher education, County schools, the local library, health care, government, public safety, non-profit organizations, the county economic development organization, and the business community.

The **technical advisory subcommittee** should provide a tracking resource for the current state of the infrastructure (what has changed since the last meeting and what is known or planned to be done). The responsibility of this subcommittee could include ongoing mapping of known infrastructure resources such as fiber optic cabling, wireless towers, and other assets that could be of use to a developing infrastructure. It should also educate and inform the project management committee of its local/regional/statewide technology options, act as an intermediary in communications with vendor representatives, and serve as an educational/issue awareness resource to the larger community. Representatives of the technical advisory subcommittee may be able to present periodic "state of the infrastructure" presentations to city council, county commissioners meetings, and Chamber of Commerce meetings, etc.).

The technical advisory committee should review and comment on any proposals submitted in response to issued RFPs and will provide ongoing advice to the management committee in its decision-making process in evaluating any new proposals. The technical advisory committee could also be asked to periodically advise the management committee on the progress and impact of the eventual implementation of the proposed community infrastructure.

The **purchasing/legal/business process subcommittee**, if such a group could be convened, might be the most important working group for the Partnership in the short term. This group could address the issues of how aggregation can be accomplished within the differing business/purchasing/legal environments of its constituents. It also may serve the largest number of interested parties, if group purchase agreements -- for cell phone service, for example -- become an early focus of the Partnership. This group could also address issues such as:

- Rapid and practical implementation of group purchasing practices for telecommunications network technologies
- A common inter-government agreement (IGA) template, as well as identifying acceptable common versions of other necessary agreements, perhaps modeled on those in use by SACCNet
- Resolution of cost sharing issues for aggregate internet connectivity, including devising a system that allows e-rate recipients to participate without jeopardizing their subsidies

- Addressing legal issues of whether the Partnership would need to have a separate legal status as a cooperative or incorporated 501.c3 Coalition

5.2 REGIONAL

Both Pinal and Gila Counties are within the area of the proposed Southern Arizona Communication Consortium Network (SACCNet) and would be participants in the County Supervisor's Association-administered project. The Pinal Gila Telecommunications Partnership goals should include facilitation of connectivity with SACCNet and communication of its benefits to potential participants.

The Pinal Gila Telecommunications Partnership should also (as a regular agenda item) seek participation in any effort to provide feedback and information to the state legislature, Arizona Corporation Commission, GITA, and the management of the State's networking projects.

Using Technology for Meetings

The number of distance education sites in both counties would make it possible for governance committee representatives to meet via teleconferencing in late afternoons at several school sites in each county. The use of the distance videoconferencing capability of educational sites would also provide valuable experience with the technology and its current level of performance in the counties.

5.3 INVOLVING COMMUNITY OF END USERS

The number of organizations that could participate in and benefit from the infrastructure development projects of the Partnership far exceeds the number that can comfortably or practically be expected to participate in committee or subcommittee meetings.

Therefore it will be necessary to consider a number of ways to categorize these constituents and communicate with them. The Partnership should identify tiers of interest such as those organizations who cannot attend meetings but want to be notified of group purchase negotiations and agreements. This can be accomplished by continuing, expanding, and segmenting the e-mail and fax notification lists that have been used to inform interested parties during the CTA process. The Partnership may also use these channels to solicit topical comments such as information about interest in specific technologies or RFP processes.

An annual technology and infrastructure conference, perhaps hosted at Central Arizona College, could also serve to increase participation and information sharing in the Partnership. Periodic summary documents, drafted and posted in PDF form on the Pinal and Gila County government websites could provide broader communication with interested community members.

6.0 DESCRIPTION OF THE COMMUNITY AND AREA TO BE SERVED

6.1 GILA COUNTY

Gila County is located 60 miles north and east of Maricopa County and the Phoenix Metropolitan area. It encompasses a land mass of 4,752 square miles, less than 4% of which is privately owned. The county has a population of 53,015 with a recent growth rate of less than 1%[1]. The county seat is located in Globe and other major communities include Hayden, Miami, Payson and Winkelman. Fifty-eight percent of the County's land is made up of public lands and includes the Tonto National Monument and National Forest, Coolidge Dam, Roosevelt Dam and Roosevelt Lake, the Mogollon Rim, the scenic Salt River Canyon and the Tonto Natural Bridge State Park. Almost 37% of the land is owned by the Apache Tribe, with the largest amount held by the San Carlos Apache Reservation.

The County has two primary population centers which are located at opposite areas of the County. In the north is the Payson-Pine-Strawberry-Star Valley cluster, and in the south is the Globe-Miami-Hayden-Winkelman cluster. This presents a significant complexity for logistical management of geographically remote clusters of citizens. The economy of the County, especially the Globe-Miami and Hayden-Winkelman area, has historically been heavily dependent on the copper mining industry. Recent downturns in productivity, and outright mine closures, have forced a more broad-based effort toward economic diversification and increased interest in the potential for tourism. Tourism is already recognized as a major economic development strategy for the Payson region in the northern portion of the County, which has deep roots in ranching and agriculture. There is also a growing segment of the population, especially in the northern portion of Gila County, which works out of their homes as home-based businesses or telecommuters. Globe has developed interest in attracting back office type of operations, often known as call centers, to provide work-force opportunities to offset recent lay-offs in the copper mining and smelting industry. High-speed telecom is essential to protect and grow this portion of the local economies.

Revenues derived from the state transaction privilege and severance tax have fluctuated by as much as 12.6%[2], with recent declines of approximately 8%. Property tax rates within at least two of the communities, Hayden and Winkelman, are the highest in the state caused by the erosion of revenues from corporate taxes from area mining interests. This property tax situation is due to the financial obligations required to support the school district with very limited resources. The biggest challenge to the County is to find a replacement economy for the copper

[1] US Census Bureau 2000 Census
[2] AZ Dept. of Revenue 2002 Annual Report

mining and smelting industry, to diversify the economy from mining and tourism and to provide higher paying jobs for residents while maintaining quality of life for its citizens.

What follows is a description of the main communities in Gila County. It should be noted that there are an additional 18,000 people residing in the unincorporated areas of the County.

6.1.1 Claypool

Sandwiched between the communities of Globe and Miami, this unincorporated community in Gila County shares an almost identical demographic profile with its incorporated neighbors. In fact, unless one pays close attention to the signage, it proves to be a challenge to identify where one of the communities ends and the next begins. With no formal governmental entity to contact or coordinate the needs assessment portion of this project, those relevant survey targets were included in the research conducted in the greater Globe-Miami region and this report does not specifically identify respondents or user profiles in a distinct Claypool category.

6.1.2 Globe

Nestled in the center of the scenic Tonto National Forest, Globe also serves as the county seat for Gila County. Globe's origins stretch back to the silver mining days of the 1870's and is located on the historic Old West Highway, at the junction of U.S. Highways 60 and 70. The 2002 population of Globe is listed as 7,525 with an unemployment rate of 4.7%[3]. Primary economic and employment activity remains vested in the mining and production of copper. The area immediately adjacent to Globe-Miami is home to three copper mines, several concentrators, a smelter and a rod mill. These employers provide more than 50% of the manufacturing jobs in the Globe-Miami area. Local efforts to diversify the economy to include tourism have received assistance from a significant investment by the federal government to upgrade and provide for new recreational amenities, including campgrounds at Roosevelt Lake. Town leaders were frustrated by the loss of a call center development due to insufficient telecommunications capacity and would still like to see that potential employment opportunity at least made possible, if not actually implemented in the immediate future.

Globe desperately needs an improved telecommunications infrastructure to be able to implement economic development plans for the town. They have been extremely innovative in addressing public safety communications obstacles with plans to construct their own microwave tower to fill in the gaps in mobile coverage.

[3] Arizona Dept. of Economic Security and Arizona Dept. of Revenue

6.1.3 Hayden

Hayden was created in 1909 as a mining camp by the Hayden, Stove and Company and was named for the president of that mining operation, Charles Hayden. With the decline of copper mining and smelting activity in the area, Hayden is a community in transition and facing serious economic challenges. Hayden's population in 2002 was 890 with an unemployment rate listed as 14% for the year 2000[4]. Located in the very southern tip of Gila County, Hayden is looking toward diversifying its economic base to include tourism and retirement services. Agriculture in the nearby San Pedro Valley is also becoming a more important economic factor. Outdoor recreational opportunities along the San Pedro and Gila rivers also provide for potential expansion of tourism and recreation. There is a very small retail presence in Hayden and a very limited service sector. Property taxes in Hayden are one of the highest in the state at 44.76%[5]. This is a significant challenge facing the town, how to grow and diversify, with special interest in attracting retirement-age residents, when the tax rate is at a non-competitive level. While improved and advanced information technology infrastructure should not be viewed as a magic solution for Hayden and neighboring Winkelman, lack of enhanced telecommunications services only magnify the serious challenges facing this area.

6.1.4 Miami

Miami is a near neighbor of Globe, and another community with a history that stretches back to the silver mining days of the 1870's. Like nearby Globe, Miami's economy is still closely intertwined with the area's copper mining, smelting and refining activities. However, it does differ from its neighbor in that Miami has been experiencing a gradual decline in population over the past few years. Miami's unemployment rate of 7% is also higher than the rest of the area[6]. The community does continue to see slight growth in is taxable sales and net assessed valuation, but construction in this community is negligible. There is an active Merchants Association which is an all volunteer group, but they are actively promoting and seeking the re-development of historic assets in downtown Miami. Like its closest neighboring community to the east, Globe, Miami's efforts to seek diversified economic development would benefit from the addition of upgraded information technology systems and broadband access.

[4] Ibid.
[5] Arizona Tax Research Foundation
[6] Arizona Dept. of Economic Security

6.1.5 Payson

Payson is the geographic center of Arizona and sits at the base of the expansive Mogollon Rim. At an elevation of 5,000 feet, the climate in Payson is alpine, by Arizona standards, making it a favorite escape for Valley residents in the heat of the summer. With long-standing ties to ranching, Payson is home to the longest, continuous rodeo in the nation. Arizona's newest state park is just north of the area; the Tonto Natural Bridge State Park is a short drive through scenic stands of ponderosa pine. With a population of 14,510 in 2002[7], Payson has the highest concentration of residents in Gila County. Payson enjoys a somewhat diverse economic base, ranging from retail and tourism to manufacturing and construction. While government is the provider of the highest number of jobs, there is a thriving and growing service sector, including a well-equipped hospital, Payson Regional Medical Center. There are a growing number of small-office/ home-office workers that would benefit significantly from enhanced information technology, broad-band access in particular. The Payson Economic Development Corporation understands the importance of accessibility and has identified enhanced telecommunications services as a key element for future economic growth in the Payson area.

6.1.6 Pine-Strawberry

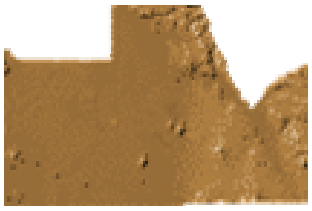
These two unincorporated communities to the north of Payson, in the northwestern corner of Gila County are experiencing significant growth, especially as summer vacation and retirement communities. Both of these communities are in the heart of ponderosa pine forests and their climate includes four distinct seasons, none of them markedly severe in temperature or weather extremes. Pine and Strawberry function as bedroom communities to Payson, with a significant number of residents commuting there for work. Next to government, the service sector is the largest employer[8]. The area is heavily tourism-dependent and would like to see more light manufacturing, construction and additional service-related businesses established. Telecommunications services are substandard but there is strong interest in obtaining better quality and higher levels of service, including broadband access. These communities believe that a number of second home owners would choose to make this location their primary residence if they were able to tele-commute and conduct business from their mountainside retreats.

[7] U.S. Census Bureau
[8] Arizona Dept. of Economic Security

6.1.7 Winkelman

Strategically located at the confluence of the Gila and San Pedro rivers, Winkelman's origins are embedded in an agricultural settlement in the area. Early overgrazing of cattle resulted in several floods in the area. While the area was settled as early as 1877-1878, Winkelman did not establish a post office until 1903, primarily in response to the location of the railroad through Winkelman. The town derives its name from a well-known cattle rancher that settled the area, Peter Winkelman. Copper mining gradually supplanted agriculture as the dominant economic force in Winkelman and the surrounding area. The large, open pit Ray Mine continues to be a source of tourist curiosity. The decade of the 1990s saw declining production and activity in copper mining, refining and smelting, leading to an erosion of the community's tax base and revenue sources. Winkelman's population has declined steadily in recent years along with a decline in workforce. The reported unemployment rate for the year 2000 was 8.1%, well above the state's average.[9] In addition, this community has experienced a drop in taxable sales from 2001 to 2002 of approximately 21%[10]. The community is making an attempt to diversify its economic base by attracting increase levels of tourism, and has played host to the Southern Crusades, a medieval celebration, for the past two years. Retirees are another focus of attention for the town, although tax rate of $33.81 per $100 of assessed valuation makes attracting that target population something of a challenge. Broadband service would certainly add an important economic development tool to this community's efforts, but even combining the numbers in neighboring Hayden doesn't provide an overall sustainable demand at the cost that would be required. At present time, it is not likely that Winkelman can make a compelling business case for attracting that enhanced level of service.

6.2 PINAL COUNTY



Pinal County shares a border with Maricopa County and the Phoenix metroplex to the north and west, with Gila and Graham Counties to the east, and Pima County to the south. Florence, the county seat, is a short 60 miles from Phoenix. U.S. Highway 60 divides the county into the more mountainous eastern portion, with elevations up to 6,000 feet, and the western portion that is dominated by low desert terrain. This diversity of geography contributes to a widely diversified economy, with copper mining, smelting, milling and refining the primary industry in the eastern region, and irrigated agriculture in the west. In addition, a number of the municipalities within Pinal County have developed a significant economic base in manufacturing, trade and services. With a population in 2002 estimated at 192,395[11], there remains plenty of open space in the 5,371 square miles that is

[9] U.S. Census Bureau
[10] Arizona Tax Research Foundation
[11] Arizona Dept. of Economic Security, Population Statistics Unit

serviced by Pinal County government. Only 25.7% of the land is privately owned. With an extensive prison system in the Florence area, the State of Arizona is the largest landowner, maintaining control of 35.3% of the county's land mass. Indian reservations account for another 20.3%, and the federal government has control over 17.5% of the territory.

Pinal County is also a major transportation corridor with I-10 running north-south from Tucson to Phoenix and I-8 connecting Casa Grande with Yuma to the west. State Highway 79 serves as an alternate route from Tucson to an intersection with U.S. Highway 60 near Apache Junction. The county is served by no less than four municipal airports, an airpark and a sail port. Given that Pinal County is home to the largest sky-diving drop zone, this is no surprise. Air transport accessibility is a significant benefit for the area.

There are a number of organized communities in Pinal County, both incorporated and unincorporated. These communities span an economic spectrum that reflects the diversity of geography and industry across the county. Government serves as the largest employer for this region of Arizona, with trade and services almost in a dead heat for second place. Agriculture and mining are in decline as major drivers of the county's economy. But Pinal County has a number of cotton gin facilities and does have an active and highly productive cotton industry. Manufacturing is still an economic contributor to this area and may increase if attempts to attract new or expand existing operations are successful in communities such as Casa Grande, Coolidge, Eloy and Arizona City.

Situated as it is so close to the Phoenix metropolitan area and with two major interstate systems running through it, Pinal County is well-positioned to experience significant growth and development in the balance of this decade. There is rapid growth and expansion in the central and southern area of the county in particular, as well as in the Apache Junction area. The older, traditional mining communities of the northeast and east are working diligently to hold on and comparison of 1990, 2000 and 2002 population figures indicate that they are at least holding their own[12].

Pinal County has a number of long haul fiber optic cables running through it, often in rural and remote locations. The challenge is to determine how best to access this invisible infrastructure to bring quality, affordable, high speed broadband access to the residents, businesses and government offices of Pinal County in a cost effective manner. There has been some preliminary interest and activity by the private sector to provide that access in limited population clusters in the county. But it is the more remote and much smaller communities, such as Superior and Kearny that will benefit most from access to broadband technologies. In other communities, such as the Oracle, Mammoth, San Manuel triangle, it will be much more difficult to generate the demand required to ensure the investment in upgraded information technology infrastructure and broadband access. But such an investment would prove beneficial in reversing the economic downturn that has impacted that area in the past five years. What follows is a description of the main communities in Pinal County.

[12] U.S. Census Bureau and Arizona Dept. of Economic Security

6.2.1 Apache Junction

Located on the Apache Trail, an historic trail used by native peoples to access the mountains to the east, and now a major highway transportation corridor to Globe and points east, Apache Junction borders the City of Mesa, part of the greater Phoenix area. This growing city was unofficially settled in the 1920's and experienced a growth spurt in the 1950's. It celebrated its 25th anniversary on November 24, 2003, having undergone incorporation in 1978. With its mostly temperate climate, and easy access to significant recreational amenities, Apache Junction has become home to 33,570 people, many of whom are drawn to retirement villages and residential neighborhoods of this young and vibrant city.

Apache Junction has a thriving retail and service sector economy. However, accessibility to the greater Phoenix metro area decreases some retail growth potential and also limits the near term likelihood of the development of expanded services, such as major health care facilities in Apache Junction itself. The City does host a community college, which is a major bandwidth consumer, and the growing ranks of small businesses that would benefit significantly from affordable and quality broadband service access. Given its scenic location at the base of the Superstition Mountains and its proximity to the Phoenix area, this community is a prime location for steady growth and development in both the residential and small business markets. Enhanced information technology accessibility will add significantly to the quality of that growth.

6.2.2 Arizona City

Unlike any other location in Arizona, this community, which has yet to be incorporated, has its origins in water. Arizona City's water source is considered to be the purest in the state, deriving from a deep underground source untainted by minerals and salts that are ubiquitous in most of the state and supplemented by run-off from the Sawtooth Mountains. In 1959, a local developer, and head of the local development corporation made a bold move and announced the development of two and a half acres of land. A post office was established in 1962 and the ownership of the community has evolved over the intervening period of time, but development continues to expand the footprint of this area.

Arizona City is located just south of Casa Grande, which provides close access to retail and services for this residential development. There is currently discussion amongst its 4,700 residents[13] about the potential benefits of incorporation, but irrespective of the outcome of those considerations, this is an area that will continue to grow given its sweet water and strategic location close to Casa Grande and mid-way between Phoenix and Tucson. Its upscale housing developments with recreational amenities is also attracting an affluent and well-educated

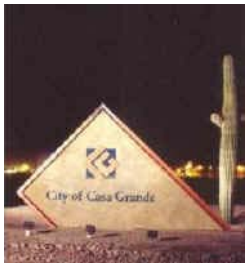
[13] U.S. Census Bureau

population base which will likely fuel demand for broadband access for both work and entertainment purposes. Assessed valuation has more than doubled from 1990 to 2002 and property tax rates have declined as growth continues to increase revenues available for the area's school district and fire district.

Arizona City also has two industrial parks ready for development with an active Chamber of Commerce. What is currently lacking is advanced telecommunications services to provide for the high quality, low impact commercial growth that this community would like to add to its economic base.

6.2.3 Casa Grande

Casa Grande has enjoyed remarkable growth since 1990, expanding its population to an estimated 27,830 residents in 2002[14]. First settled in 1879, the community derives its name from the ancient Hohokam Indian Ruins a short distance away. Located on two major interstate highways, I-8 and I-10, Casa Grande enjoys the benefits of direct accessibility to both Tucson to the southeast and Phoenix to the northwest. Casa Grande maintains a strong sense of history and has found creative new uses for beautiful old historic buildings such as its railroad station. Even the City Hall is beautifully maintained as a working civic building. While tourism is not considered a primary economic component of this community, the number and variety of festivals and arts-related events help make this a vibrant, active community with activities to appeal to a broad cross section of residents and visitors alike. Incorporated in 1915, this community has a youthful and vigorous attitude that embraces growth, development and change.



Casa Grande enjoys a diverse economic base which capitalizes on regional assets. The economy includes a thriving mix of trade, manufacturing, retail and agriculture. Factory outlet stores off the I-10 corridor also contribute to this diversity. All of the primary growth indicators – labor force, building permits, taxable sales and assessed valuation show significant growth[15] over the last decade. The service sector and trade are major employers, surpassed only by government as a source of jobs for this area. The community boasts five industrial parks, most of which have direct rail access and very easy access to I-8 and I-10. There is also a municipal airport with a paved, 5,200 foot runway.

The community hosts a 116-bed acute care, Casa Grande Regional Medical Center, and Central Arizona Community College (CACC). Both of these institutions are major consumers of technology and have embarked upon strategic expansions. The community college has a geographically dispersed service territory and employs an interactive video network to serve its more remote sites. The college has made access available to high schools in the area to deliver

[14] Arizona Dept. of Economic Security
[15] Arizona Dept. of Revenue; Arizona Tax Foundation

advanced coursework to a varied population. The regional medical center already is a consumer of bandwidth, paying for three T-1s to its facility, and is concerned that its physician population desires quality broadband access at their offices and homes to facilitate a continuum of quality health care for the community.

City government is also a sophisticated consumer of information technology and all of its departments would like to capture the efficiencies that expanded use of technology would provide for the residents and businesses of Casa Grande. Use of geographic information systems (GIS), global positioning equipment (GPS) and geospatial data sets would increase responsiveness and capabilities of the public safety entities, police and fire, as well as streamline planning and zoning activities with the use of interactive datasets available on-line. Some of these activities are currently being undertaken, others remain on the drawing board, pending increased capacity of the community's infrastructure. Given the outlook for continued growth in Casa Grande, this community will be a significant broadband technology consumer now and in the foreseeable future. Qwest recently (fall of '03) notified the city that it will make DSL service available in some areas of the city.

6.2.4 Coolidge

Named after President Calvin Coolidge, this community has strong ties to the Coolidge Dam, which made irrigated agriculture possible in the otherwise arid desert environment. Today Coolidge serves as the commercial center for the cotton industry in Arizona. Established in 1925, following the completion of the dam, Coolidge was incorporated in 1945. Still closely tied to production agriculture, the community has been successful in attracting some manufacturing and tourism to the area, as well as some large retail trade outlets. Coolidge has also expanded trade and services related to agriculture. The near-by Casa Grande Ruins National Monument contributes to the success of tourism efforts of the community and hosted 97,645 visitors in 2002.[16] Coolidge is following the trend toward growth found in most of Pinal County. It has seen a steady population increase throughout the '90s and taxable sales has more than doubled between 1990 and 2002.[17]

There is a municipal airport with two paved and lighted runways, the longest at 5,590 feet. A 70 acre industrial park is located in the southwest part of the city. The State of Arizona operates a residential training program for the disabled which provides some employment opportunity for Coolidge citizens.

The city has just opened a new Youth Center in town which is equipped with computers and internet access. The public safety departments are users of information technology, but city budget constraints have not allowed for larger scale use of more sophisticated (and expensive) applications and equipment. The city does contract for IT technical support with a local vendor

[16] National Park Service
[17] Arizona Dept. of Revenue

and has some understanding of the importance of broadband service infrastructure and access to its future economic vitality. The community has just recently (fall of '03) been notified that Qwest is making DSL service available in this part of Pinal County.

6.2.5 Eloy/Toltec

Eloy was settled in 1902 when the Southern Pacific Railroad located a switch at that site. Originally called Cotton City, it was granted a post office in 1919 which was designated as Eloy. The city incorporated in 1949. Cotton growing and cattle ranching are the major agricultural activities in the Eloy area, but its location on the "Golden Corridor", or I-10, has led to the development as a travel and commercial center. Economic growth indicators are mixed, showing some decrease in taxable sales between 2000 and 2002, but more than a doubling of those sales from 1990 to 2000. Building permits are rising and the assessed valuation has steadily increased from 1990 to 2002.[18] There is high unemployment in this community; estimated at 14.3% for 2002.[19] The average age in Eloy is 27½ years, making it one of the youngest communities is Pinal County. This community also has migrant workforce impacts.

There does currently exist an international manufacturing company that uses three ISDN circuits for video conferencing and would benefit from having a higher speed, less costly alternative. City government would also like to become a major user of broadband capacity and information technology applications, but budget limitations have restricted plans in that investment area. Still, this area is poised to be an important consumer of broadband services in the near future.

6.2.6 Florence

Florence serves as the county seat for Pinal County. The fifth oldest town in Arizona, it retains the historic and cultural flavor of the 1880's with its almost completely original and historic Main Street, which still serves as the community's business district. Florence was selected as a Main Street Program in 1987 by the National Trust for Historic Preservation. There is currently a long-standing effort underway to restore the magnificent clock tower of the 1891 county courthouse to its original splendor. Florence's location makes it readily accessible to both Tucson and the Phoenix metropolitan area which are both about an hour away.

With the county government offices and the Arizona State Prison facility located within the community, government is a major source of employment for Florence. There is also employment provided by the private prison industry that operates in the area. Agriculture is still an economic driver for this community as well, with cotton, grapes, grains and cattle all being grown in the surrounding area. While unemployment is low, other economic growth indicators

[18] Arizona Dept. of Revenue; Arizona Tax Research Foundation
[19] Arizona Dept. of Economic Security

present a mixed economic picture. Taxable sales grew at a record pace in the 1990's but data from the Arizona Department of Revenue indicate a greater than 50% reduction in taxable sales between 2000 and 2002. Assessed valuation has shown a steady increase during the same period.[20] Population estimates for 2002 put Florence's population at 14,540, a decrease of almost 3,500 from 2000 census numbers.[21]

The Pinal County office complex is a sophisticated user of broadband capacity and maintains a robust county network. The town itself has recently undertaken hardware and software upgrades and its new town hall is wired for an internal network. The town would like to expand its broadband capacity and provide for communications with its departments located outside of town hall, especially the police department and fire department. The chief of police is interested in the benefits of intelligent traffic systems as well as mobile laptop access for his officers. Qwest has recently announced that DSL broadband service is available in Florence, good news for a community that clearly understands the importance of information technology to its economic vitality.

6.2.7 Kearny

Kearny originally served as a base camp for the general and explorer Stephan Watts Kearny as he explored the Gila River in 1849-1850. But it wasn't until more than one hundred years later, in 1958, that the current community of Kearny came into existence. The rapid expansion of the Kennecott open-pit copper mine and reduction plant claimed the communities of Ray, Barcelona and Sonora, so the Kennecott Mine Company created this planned community to house its workers. Kearny was incorporated in 1959. This community has maintained a stable population base during the 1990's, even as near-by communities were seeing a decline in population and revenues. The median household income for Kearny is one of the highest in rural Arizona at $39,906.[22] Employment is primarily in the mining sector, with a developing retail and service sector. Government is also a significant source of employment for this community. There is a stable workforce population and Kearny enjoys a low unemployment rate, estimated to be 3.7% for 2002.[23]

At an elevation of 2020 feet, Kearny enjoys a moderately temperate climate by Arizona standards, and the creation of Kearny Lake and a nine-hole golf course has made it an attractive place for retirees to establish residence. The crime rate is significantly lower than the national average, and there is a modestly-equipped family medical clinic which provides a spectrum of medical services for the community.

[20] Arizona Tax Research Foundation
[21] U. S. Census Bureau and Arizona Dept. of Economic Security
[22] city-data.com
[23] Arizona Dept. of Economic Security

Town government is forward-looking and understands the importance of technology and broadband access, both to make service delivery to its citizens more efficient, as well as providing for economic development opportunities. While current information technology infrastructure and use by municipal government is not advanced, there is awareness that upgrades need to occur in the near future and the administration is exploring how that may be funded over the next several budget cycles. This is a community which values access to broadband technologies and will be a strong consumer of those services in the future.

6.2.8 Maricopa – Ak Chin Indian Community

Maricopa has its origins in the days of the stagecoach. It has undergone several variations in its name over the intervening period, originally established as Maricopa Wells, a stage stop for the San Antonio and San Diego Mail in 1875. The Southern Pacific Railroad located its Yuma to Tucson line south of that location and the community moved to be closer to the railroad, changing its name to Maricopa Station. The community became known as Maricopa Junction in 1887 with the extension of the rail line into Phoenix. Over time, "Junction" was dropped and it has become known as Maricopa. Maricopa just recently incorporated. It is located 16 miles south of Phoenix. The population of the Maricopa area is predicted to grow from 5,000 to 200,000 in the next decade – 2,000 homes have been built there in the past two years and 32 housing developments are in the planning stages for the area.[24]

The Ak Chin Indian Community has a population 716 (2002 estimates)[25] and a land area of approximately 22,000 acres. The reservation is five miles south of the newly incorporated city of Maricopa in northwestern Pinal County and about 30 miles south of Phoenix, below and approximately 12 miles from the western half of the Gila River Indian Community.

The Ak Chin Community economy is diverse and includes agriculture, Harrah's Ak Chin Casino, an industrial park, and an array of tribal government services. The Tribal Government has its own high quality infrastructure which it built. However, the community residents still lack quality telecommunications services from the provider and there is not currently any cable or broadband service available in the community. The tribal community has identified some important near term goals for telecommunications development which include improving the stability and redundancy of existing systems, particularly public safety. When the current phone system fails, the 911 system routes calls to Pinal County which then relays the calls to Ak-Chin via radio. Given the current plans for rapid growth and development, the Maricopa – Ak-Chin Community present a significant opportunity for broadband consumption in the immediate future.

[24] "Maricopa Becomes a City"; Arizona Republic, 10/16/2003
[25] U.S. Census Bureau

6.2.9 Oracle – Mammoth – San Manuel

This is a triad of communities with only one, Mammoth, being an incorporated municipality. Located on the eastern edge of Pinal County, this area has been hard hit by the recent closing of the BHP copper mine and a decrease in overall mining, refining and smelting activity. San Manuel has several assets which are helping to offset the loss of a major employer; an airport with a paved runway, a family health clinic with video conferencing connectivity to Casa Grande, and a nine-hole golf course and country club. Oracle is only 40 miles from Tucson, and has developed into a bedroom community for both Tucson and the Biosphere II project. This effect is further evidenced by the median housing price in Oracle which is estimated to be $106,000.[26] Unemployment figures range from 2.2% in Oracle, to 5.3 % in San Manuel and 9.0% for Mammoth.[27] Oracle holds the most potential for broadband service demand but currently has minimal access to cable and basic phone service. Lack of infrastructure has stifled expansion of small office, home office businesses that rely on technology for market access. As development north of Tucson continues to move up valley, demand is anticipated to grow even more.

6.2.10 Sacaton – Bapchule – Gila River Reservation

While Sacaton and Bapchule are not incorporated municipalities, Sacaton in particular has significance since it serves as the seat of government for the Gila River Tribal Nation. This is a youthful community with the average age being estimated at 25 years of age. Population of Sacaton was listed as 1,584 for 2000, but the entire Gila River Reservation has a 2002 population estimate of 12,050.[28] The Gila River Tribe has a number of business interests including; a 20 bed hospital in Sacaton, HuHuKam Memorial Hospital, which is managed by a separate tribal corporation, a tribal justice center, schools and youth facilities. The Gila River Reservation spans 372,000 acres in both Pinal and Maricopa Counties. There are seven districts on the reservation and an active economic development effort in place. The tribe owns and operates the Gila River Telecommunications company as well as several casinos in the Phoenix metro area. The nationally acclaimed Lone Butte Industrial Park on the outskirts of Phoenix is also owned and managed by the Gila River Tribal Nation. The reservation has an active interest in production agriculture in the area surrounding Sacaton and Bapchule. The clustering of tribal administration and services in Sacaton provide significant bandwidth demands for the schools, justice center, hospital, youth center and administrative offices. With immediate access to I-10, Sacaton's location is well-suited for commercial and industrial growth in the near future.

[26] city-data.com
[27] Arizona Dept. of Economic Security – 2002 estimates
[28] U.S. Census Bureau

6.2.11 Superior

The Town of Superior is nestled in the mountains east of Phoenix and covers a land mass of 4 square miles. The town is land locked, completely surrounded by federally owned lands, the Tonto National Forest. Like many other communities in this part of Arizona, Superior has its origins in silver and copper mining, and was named after the Lake Superior Mine, which was owned by stockholders in Michigan. As the veins of silver ran out, copper became the predominant metal produced. The Magma Copper Mine is Arizona's largest underground mine. A copper smelter was constructed in 1924 and was active until 1971. The community incorporated in 1976, largely in response to the challenges presented by the closure of the smelter and the decrease in employment at the area mines. The town has seen a gradual loss of population through the '90s and 2002 unemployment figures were are 8.5%.[29] Median household income is estimated to be $27,069.[30] Taxable sales grew through the decade of the '90s, more than doubling, but have seen an almost 25% decline between 2000 and 2002.[31]

Government serves as the major employer for this community, and the location of the Central Arizona Association of Governments offices has been a significant economic development opportunity for Superior. Health care services are provided by a clinic operated by the Cobre Valley Regional Medical Center in Globe and the clinic is housed in a building owned by the Town of Superior. There is a local elementary, middle and high school in the community. The town is exploring the potential for tourism to help diversify its economy helped by its location on the highly scenic U. S. Highway 60, proximity to the Phoenix metro area, and ready access to the Boyce Thompson Arboretum. The town also has three recognized historic districts, but the majority of the downtown business district is owned by a single interest that has yet to exhibit a strong inclination to develop it. The town has made some improvements on the main street which is a solid beginning in attracting a more active business community to the downtown corridor.

The most sophisticated technology consumer in the community is the Central Arizona Association of Governments (CAAG), and these offices have plans to expand the applications that would best serve the interests of their member local governments to include a robust GIS infrastructure as well as providing public access terminals for internet access. The Cobre Valley satellite health clinic would also benefit from more advanced broadband technology access. The town has no immediate plans for expanding its limited use of technology, but is aware that broadband access is an important asset for future economic development efforts.

[29] Arizona Dept. of Economic Security
[30] city-data.com
[31] Arizona Dept. of Revenue

7.0 INFRASTRUCTURE INVENTORY

7.1 INCUMBENT LOCAL EXCHANGE CARRIERS

7.1.1 Qwest Communications International

Qwest is the local telephone company for most of Gila and Pinal counties. Qwest services are available in the following Pinal and Gila County locations: Globe, Hayden, Miami, Payson, Pine, Superior, Roosevelt, Winkelman, Queen Creek, Apache Junction, Arizona City, Casa Grande, Coolidge, Eloy, Florence, Kearny, Maricopa, Oracle, San Manuel, Stanfield, Bapchule, Picacho, and Red Rock.

Aside from required disclosures, Qwest provides no summary document of its broadband connectivity services by location, so the following information was assembled from published sources and comments from communications with Qwest staff members.

The CTA survey discovered anecdotal reports of ATM connectivity for the school district and city/library offices in Apache Junction, but Qwest ATM disclosures do not identify any locations for ATM service in Pinal or Gila Counties. ATM connectivity may be available to Pinal County users from adjacent wire centers in Chandler and Mesa, for example. Qwest's ATM disclosure notes:

> *QWEST now supports four UNI physical connections with the maximum bandwidths of 1.544 Mbit/s (DS1), 44.736 Mbit/s (DS3), 155.520 Mbit/s (OC-3), and 622.08 Mbit/s (OC-12). ...Qwest also supports IMA (Inverse Multiplexing over ATM) access speeds 3.088, 4.632, 6.176, 7.72, 9.264, 10.808, or 12.352 Mbit/s.*
>
> *...ATM Service Points are geographic locations, designated by QWEST, as entry points into the QWEST ATM Service Network. ...Wire Centers not listed as ATM Service Points are still accessible using the Private Line Tariff. Mileage and other construction charges may apply.* *www.qwest.com/disclosures/netdisclosure400/news.html*

Qwest frame relay switches that serve areas in Pinal and Gila County are located in Casa Grande, Globe (served from the Tucson Main Frame Relay Switch), Tempe, Tucson (main), and Tucson (north). The Casa Grande switch serves Arizona City, Coolidge, Eloy, Florence, Maricopa, and Stanfield. The Globe central office (from Tucson Main Frame Relay Switch) serves Kearney, Hayden, and Miami. Tempe serves Queen Creek. Tucson Main serves Oracle. Tucson North serves Oracle and San Manuel. Switches serving areas in Pinal and Gila Counties not named above cannot be identified from published sources. Also, no information on bandwidth capacity (or lack of capacity) is published. A complete list of Qwest Frame Relay switches and the areas they directly serve is at http://www.qwest.com/disclosures/netdisclosure401/az_data.html.

Recently, Qwest announced the availability of DSL service in Apache Junction, Coolidge, Casa Grande, and Maricopa. Qwest DSL may expand to other communities (such as Florence) near

these announced locations in 2004. Qwest DSL will also become available in Maricopa and Eloy in February, 2004, and in Arizona City early in 2004.

Qwest has begun an initiative to work closely with communities creating petitions for DSL service and acknowledges an increased interest in implementing innovative low-cost DSL remotes in selected locations. Qwest is testing a combo card to run DSL over pair-gain line. Also, in areas near where Qwest DSL is available, if 60-75 people sign a petition within a development, Qwest will consider putting in a plan for a remote.

In December 2003, Qwest received unanimous approval of its 271 application to reenter the long distance business in Arizona. A 2001 Goldwater Institute Study of the potential effects of Qwest's re-entry in to the Arizona long distance business noted that there might be a significant benefit for school districts in the state. It predicted that smaller school districts, "which have proportionately higher expenditures than larger districts," would benefit disproportionately, "saving millions of dollars" [statewide]. Estimating the anticipated savings to be approximately 15% (based on the experience of other states) the report added,

> *Ultimately, anticipated price reductions in telecom services may be overshadowed by more dramatic reductions in the price of broadband internet access. Thus we can expect 271 relief to impact not only the cost of telecommunications services, an important component of educational overhead expenses, but also the cost of providing schools high speed internet access.*
>
> *[p.29, "The Economic Effects of Increasing Competition in Long Distance Telecommunication Services in Arizona, David Sosa, Analysis Group/Economics; Arizona Issue Analysis 166; November, 2001; Goldwater Institute, http://www.goldwaterinstitute.org/pdf/materials/15.pdf]*

At a January 14th meeting of the Partnership, Qwest representatives -- without making any specific commitments -- responded to a question about service availability in Superior with comments suggesting that the 271 decision made the potential for service improvement in Superior and other rural areas much more likely. Among other effects of the 271 decision, the LATA boundary issue that has been a problem for Superior and several other communities will be eliminated for data circuits (with lower costs expected) and "dial 1" long distance charges will be significantly reduced.

According to Qwest marketing materials, since 1998, Qwest has spent nearly $2.9 billion to build and upgrade a state-of-the-art communications network in Arizona, raising the sum of its total investment in Arizona's infrastructure to almost $6 billion. The Qwest charitable foundation has contributed $5.7 million to Arizona charitable and community organizations since 1998.

General information about Qwest's Arizona offerings can be found at ArizonaTele.com website (http://www.arizonatele.com/cgi-bin/profile.cgi?id=214) or on the Qwest corporate website http://www.qwest.com/.

A recent Qwest brochure titled "Qwest's Continued Commitment to Our Customers -- to Our Employees -- to Our Competitors -- to Arizona" can be found in Appendix J. The brochure includes key contact information (mail address, phone, e-mail) for the President and eight other executives of Qwest Arizona.

Qwest-supplied product/service availability information, plus information on Qwest services for K-12 schools can also be found in Appendix E.

7.1.2 Gila River Telecommunications (GRTI)

Gila River Telecommunications Inc. (GRTI) is a privately held, independent telco, in business since July, 1988 that provides the Gila River Indian Community with telephone service and other telecommunications services. At the time this report is being assembled, GRTI had a sudden management change that has delayed review and approval of a more detailed description of GRTI services.

Products and Pricing
GRTI offers DSL service (SOTHK-DSL) charging a monthly fee of $32.95 plus $19.95 for internet access for a total of $52.90. DSL modems may be purchased for $120 in one lump sum or in three $40 payments over three months.

Contact: Ken Reedy, Acting General Manager
520.796.8885
www.gilanet.net

7.1.3 San Carlos Apache Telecommunications Utility

In 1994, the San Carlos Apache Tribal Council established the San Carlos Apache Telecommunications Utility (SCATUI). In 1997, SCATUI received a $14.1 million USDA/RUS loan to purchase the 475/San Carlos exchange (which exists completely within reservation boundaries) from US West.

Before the tribal-owned telephone cooperative purchased and expanded the phone system, only about a quarter of homes on the reservation had telephones across the 2,854 square-mile San Carlos Apache Indian Reservation which lies in Gila and Graham counties. The town of Bylas, for example, had only two residential lines and one pay phone. A resident was quoted as remembering this time when "People would start lining up at 6 am to use the (pay) phone, and the line didn't go away until after midnight."

Today SCATUI has built a state-of-the-art, digital switched phone system with a fiber optic backbone. The company now serves approximately 2500 subscribers. The San Carlos Telecommunications Utility in San Carlos is in the process building a fiber optic connection (route) to Safford, Arizona. This will allow the San Carlos Telecommunications Utility to have a direct fiber connection to the Qwest main central office in Tucson, Arizona. The San Carlos

Telecommunications Utility is reviewing the feasibility of providing a broadband, fiber optic connection to Globe, Arizona.

SCATUI introduced dial-up ISP service to the reservation in the summer of 2003 and the subscriber rate has exceeded expectations. On September 24, 2003, the SCATUI received a USDA Community Connect Broadband Grant of $164,280 to add Asynchronous Digital Subscriber Line (ADSL) equipment to telecom sites that will cover the town of San Carlos. SCATUI was one of 34 communities in 20 states to receive these grants.

SCATUI is the e-rate provider for the San Carlos Public Library, Peridot Lutheran School, San Carlos Unified School District, and St. Charles Mission School.

San Carlos Apache Telecom broadband connectivity services are available as shown in the following table:

COMMUNITY	DSL	T-1	Frame Relay	IP
Bylas	X	X	X	X
Peridot	X	X	X	X
San Carlos	X	X	X	X

SCATUI also provides Class/Custom features to customers in these communities.

Contact: Vernon James, General Manager
928.475.7043

7.1.4 Midvale Telephone Company

The small, family-owned Midvale Telephone Telephone Company provides residential and long distance service in Cochise and Gila counties to the towns of Benson and Young. It has no plans to expand its service offerings. Young is connected to the Qwest network by two T-1 lines. Midvale contracts with The River ISP to provide internet service to its customers.

Contact: Dennis Farrington, Arizona Manager
http://www.arizonatele.com/cgi-bin/profile.cgi?id=177.
520.212.5200

7.2 Cable Television/Wireless/ISP Providers

7.2.1 Arizona Educational Network (AZEdNet)

The Arizona Educational Network is a private network created by educators for educators, owned and operated by Portable Practical Educational Preparation, Inc. (PPEP) a statewide Charter school in Arizona. Arizona Educational Network (AZEdNet) is a statewide network originally funded by the Arizona Department of Education in 1999, and designed to provide a

one-stop solution for secure, filtered (Child Information Protection Act - CIPA compliant) high-speed Internet access for educational institutions. AZEdNet converted to a fee-based service on January 1, 2002. The network currently provides Internet access, e-mail, web content filtering and hosting to numerous school districts, charter schools, and businesses throughout the state.

AZEdNet is a statewide private network originally designed to provide a secure means for schools to submit student-level data to the Arizona Department of Education. The service includes CIPA compliant web content filtering for participating schools. Partners include the Arizona Department of Education, Cisco, Alpha Communications, Cable and Wireless, Qwest, Ensynch, and Cox.

Current Infrastructure
AZEdNet is a reseller, providing services from its partner entities which may include DSL, or digital connectivity from 56K to T-1.

Future Plans
AZEdNet projects the addition of a hub in Yuma in June 2004, with a future hub planned for Casa Grande.

Contact: Rick Brow
520.294.6997 x2019
http://azednet.org/

7.2.2 AZT-1

AZT-1 is a wireless broadband Internet provider serving Eloy and Toltec.

Current Infrastructure
There are three antennas on the AZT-1 facility at the airport in Eloy, one in the city of Eloy and one in Toltec. This company uses a Qwest T-1 for internet backhaul.

Products and Pricing
Bandwidth speeds offered are 1.544 Mbps upstream and 1.544 Mbps downstream for residential households and commercial customers. Wireless rates are $50 per month for residential and $100/month for commercial. Dial up is not available.
Contact: Jim Chastain
520.360.3239
jim@skydiveaz.com
www.azT-1.com
http://www.skydiveaz.com/AZT-1.htm

7.2.3 C2i2

C2i2 offers dial-up internet services only in the Casa Grande area. Since C2i2 is a reseller, it does not directly provision services but has relationships for DSL broadband sales with DakotaCom.net utilizing New Edge Network's national infrastructure. This infrastructure includes Cisco carrier-class routers in over 30 major metropolitan markets, DSL in 600 central offices serving 350 small to mid-sized cities nationwide.

Products and Pricing
Residential dial up accounts start at $19.95 per month with discounts available for longer term contracts and special accounts (Military, Senior, Student, Education). Business accounts start at $34.95 with a $40 one-time set up fee.

Contact: Terry Kemp, Computer and Things
520.836.3921
tmkemp@computerandthings.com

7.2.4 CableAmerica

Headquartered in Mesa, CableAmerica provides cable television and Internet service to approximately 25 communities in Arizona, California, Michigan and Missouri. CableAmerica is among the 40 largest cable operators in the US. In Pinal County, CableAmerica is the cable television provider to Florence, Coolidge and Queen Creek. A number of the prisons in Florence receive video from CableAmerica.

Current Infrastructure
CableAmerica utilizes an infrastructure encompassing newly completed hybrid fiber/coax backbone (870MHz) from Mesa south to Florence and Coolidge covering over 100,000 homes. Currently, there are less than 500 households per node; this relationship is monitored and can be lowered based on throughput speed and results. The rebuild has enabled CableAmerica to increase its cable television channels from 60 channels to over 240 channels, including digital tiers, HDTV and High Speed Cable Modem Internet service. A wireless High Speed Internet service utilizing Alvarion equipment is deployed to cover the more rural areas outside the fiber backbone.

Future Plans
The Company has launched IP telephony as powered by Vonage. It will be rolled out to all customers in 2004. Additionally in 2004, CableAmerica will be making available DVR (digital video recorder) services to customers throughout its service area. The Company is currently studying VOD (video on demand) deployments and structures to best benefit the customer.

Products and Pricing
Cable High Speed Internet service starts at $34.95 per month. Cable modems can be leased for $10 per month, purchased for $84.95 from the Company, or purchased from many retail outlets.

Contact: Christopher Dyrek
480.558.7300
info@cableaz.com
www.cableamerica.com

7.2.5 CableONE

CableONE, affiliated with the Washington Post group of companies is the primary cable television company for the Globe area with its regional headquarters located in Phoenix. Cable television and high-speed internet service is offered in Central Heights, Claypool and the Canyons, Globe, Miami, and the Wheatfields area. The internet service has been in the marketplace for over two years.

Current Infrastructure
The cable plant consists of a fiber/coax backbone. There are currently six nodes with 200 to 400 households per node. CableONE utilizes eight (8) T-1s from AT&T (through the Washington Post affiliation) and Qwest for backhaul.

Future Plans
The Company is developing packages to compete with DISH Networks. They have added a nine channel Starz! Package at $11.95, a ten-channel package of Hispanic programming for $2.49 that includes five channels of DMX Music Español, and have created two bundled packages of channels at $89.95 and $99.95.

Products and Pricing
CableONE's cable modem service offers high-speed internet connections with download speeds from 500 Kbps to 1.544 Mbps and upload speeds from 128 Kbps to 512 Kbps. In addition, commercial accounts provide persistent IP addresses and data priority. Residential prices range from $39.95 to $59.95 and commercial prices start at $99.95. Multiple e-mail accounts and web space is included in the packages.

Over 170 digital channels are accessible, including 45 channels of digital music, 41 premium movie channels, 41 pay-per-view movie channels as well as HDTV for those channels broadcasting in the HDTV format (includes HBO and Showtime). Pricing starts at $50.45 for the basic digital package and increases to $67.40 for the Basic Digital plus HBO/Cinemax package.

Contact: Ingo Radicke
928.425.3161
iradicke@cableone.net
www.cableone.net

7.2.6 CableVision of Payson

CableVision provides 130 channels of cable television to its over 4,900 customers. There are 59 basic channels, 16 digital basic, 5 pay-per-view, 20 premium and 30 music channels. In addition, CableVision offers high-speed internet service to Payson, Star Valley, Mesa Del, Oxbow and Round Valley.

Current Infrastructure
CableVision has a fiber/coax backbone throughout the City of Payson and Star Valley. This backbone is two-way in the City of Payson, Star Valley and Mesa Del and will soon become two-way in Oxbow and Round Valley as Arizona Public Service erects new poles in those areas.

Future Plans
The entire company is considering offering VOIP sometime in the future. The engineers are currently researching the various VOIP technologies and if VOIP will be economically feasible as a new product offering.

Pricing
Basic cable service starts at $36.80 per month. Digital basic is an additional $9.95. Premium channels are offered either a la carte at $7.95 or $10.95 or in packages. Cable internet service is $34.95 for residential households. The commercial rate starts at $ 64.95

Contact:
Jack Buchea, System Manager
928.474.1217
jbuchea@npgco.com

Wayne Beikmann, General Manager, 928.779.3661
Wbeikmann@npgco.com

7.2.7 Canyon Broadband

A new wireless provider to Arizona, *Canyon Broadband*, is offering fixed wireless broadband service to the City of Payson, Star Valley and residences in the surrounding area that can "see" 1 of 5 transmission points they have established.

Current Infrastructure
The Company currently has wireless antennas on three city water tanks as well as two residences. Canyon Broadband has permission from the Town of Payson to erect their antennas on all Town water tanks as needed. The equipment used is manufactured by Alvarion for the base station and customer premise equipment; they also use various third party equipment as needed.

Future Plans
As the wireless infrastructure is built out, the Company is looking to possibly offer service to the Pine and Strawberry communities as well as other Arizona communities. Allstar Ventures, Inc the holding company of Canyon Broadband and Big Sky Internet of Butte Montana, has also created an equipment leasing division for other WISP's as well as a developed service bureau application that covers all the back office customer data base support, billing and system monitoring needs for WISP operators as well.

Products and Pricing
Internet speeds of 256 Kbps to 512 Kbps (and more) are available to residential customers for $39.95 to $59.95 per month. Installation is a one time fee of $100 and the equipment can be rented for $10 per month. Businesses can contract for speeds of 256 Kbps to 1.5 Mbps for monthly fees of $39.95 to $800 and installation fees from $200 to $800. Canyon Broadband also offers Ethernet cards, USP adapters, web hosting and other networking equipment to purchase, they defer to local vendors from the actual networking integration.

Contact: Bill McNamara
928.468.6898
bill@cbiwireless.com
www.cbiwireless.com

7.2.8 Casa Grande Internet

Casa Grande Internet is an internet service provider serving Arizona City, Casa Grande, Coolidge, Eloy, Toltec and Florence. Dial-up service is offered in all the above cities and DSL is available in Casa Grande and Coolidge. DSL service is offered at 256 Kbps with a one year contract. Residential customers are charged $29.95 for the first 3 months and $34.95 for subsequent months. Business customers are billed $39.95 for the first 3 months and $44.95 per month thereafter.

Contact: Dave Walker
520.421.3333
dwalker@cgmailbox.com
www.casagrandeinternet.com

7.2.9 Comcast Communications

Comcast is located just north of Tucson. Although they are not currently providing service in Pinal or Gila Counties, the long range plans are to service communities north of their current service territory. Future expansion areas could include Saddlebrook (3,000 households), Red Rocks, Willow Springs, and the area just south of Eloy and perhaps Oracle.

Current Infrastructure
In the Tucson area, Comcast has a fiber/coax backbone at 870 MHz plant.

7.2.10 CopperNet Systems

CopperNet Systems, Inc. started in 1998 serving Dudleyville, Hayden and Kearny with dial-up service. Five years later, CopperNet offers high-speed wireless Internet, networking, telephony and web hosting solutions to many communities in Gila and Pinal Counties and, has expanded their dial-up service, which is available in most cities & towns in the U.S. and Canada.

Current Infrastructure
Wireless/microwave coverage is available in Kearny, Hayden, Winkelman, Dudleyville, Globe, Miami, Claypool, Central Heights and surrounding areas. CopperNet currently owns 100% of their infrastructure which consists of both licensed and unlicensed microwave equipment.

The core network is built around Cisco Systems Hardware with load-balanced/redundant systems to reduce downtime to a minimum providing carrier class service at 99.999% availability. Their fault-tolerant server farm offers many features including traditional E-mail service with optional WebMail access, Web hosting, Online customer access to their account, DHCP, DNS, Quality of service, Spam-Filtering, and much more.

Future Plans
In Q1 2004, CopperNet Systems will be expanding their infrastructure throughout Pinal County to include San-Manuel, Oracle, Apache Junction, Gold Canyon, and Florence.

Products and Pricing
Wireless internet access packages are available for residential, small business and enterprise customers at speeds ranging from 384Kbps to 3Mbps. Point-to-Point circuits are available to businesses with speeds up to DS-3. Published monthly rates start at $39.95 for residential, $109.95 for small business. These rates do not include any discounts or other negotiated prices.

Contact: Jeff Crawford
888-363-4267
sales@coppernet.net
www.coppernet.net

7.2.11 Cox Communications, Inc.

Cox Communications is the primary cable television provider for the Casa Grande area offering classic cable television programming. This is a city that is growing by 800 to 1,000 homes per year. The population grows from 28,000 in the summer to 50,000 in the winter. The "snowbirds" primarily use the local libraries for internet access. The new license agreement between Cox and the City of Casa Grande stipulates the addition of digital television programming (for a total of roughly 250 channels) and high speed internet service by June 30, 2004 to the Casa Grande area.

Current Infrastructure
Cox uses a hybrid fiber/coax backbone. Now that a new license agreement is in place, Cox is rebuilding their plant to a two-way 550 MHz system so that they can offer advanced services next June. After the rebuild, the structure will be roughly 750 homes per node with more nodes added as customer volume on the high-speed internet backbone increases.

Future Plans
The new license agreement between Cox and the City of Casa Grande stipulates the addition of digital television programming (for a total of roughly 250 channels) and high speed internet service by June 30, 2004 to the Casa Grande area.

Products & Pricing
Once the rebuild is complete, Cox will offer all the products that are currently available in the Phoenix area. These products include digital television, high speed internet, digital video recorders, iNDEMAND pay-per-view, HDTV, and digital telephone. Prices start at $39.95 with modem purchase or $54.95 with modem rental for Cox cable TV customers. If you do not subscribe to another Cox service, an additional $10 per month is added to the price. Special promotions vary but may include: free installation and/or activation, free modem, time limited, free premium services or temporary reduced service fees.

Contact: Dan Newham
623.594.0505
daniel.newham@cox.com
www.cox.com

7.2.12 Cybertrails

Cybertrails is headquartered in Phoenix and offers dial-up service in the following Gila and Pinal County communities: Globe, Miami, Payson, Pine, Star Valley, Strawberry, Apache Junction, Arizona City, Casa Grande, Coolidge, Eloy, Florence, Stanfield, and Toltec. Redundancy is guaranteed through fiber connections with Cox, Qwest and ELI, and backbone providers UUNET, Broadwing and Global Crossing.

Current Infrastructure
Wireless is currently being offered to the City of Casa Grande and the City of Payson.
Point-to-point and frame relay wireless for residential households and the business sector is in the planning phase.

Products and Pricing
Dial up ranges from $9.95 per month to $21.95 per month for statewide access.

Contact: Paul Fox
623.434.6081
paul.fox@cybertrails.net
www.cybertrails.com

7.2.13 Eagle West Cable Company

Eagle West currently provides cable television service to Maricopa, Eloy (Toltec, Arizona City, Florence Gardens), Hayden (Winkelman, Dudleyville, Indian Hills), Kearny, Mammoth, Oracle, Pinal West (Casa Grande), San Manuel, and Superior.

A group of attorneys originally built these cable systems in the late 1980s under the name of Wonder Communications. Unfortunately, the owners significantly underestimated the amount of capital it takes to build systems and, after a brief time in bank receivership, the systems were purchased by Eagle West Cable, LLC. Currently, Eagle West Cable is operating under Chapter 11 protection and its systems are for sale. Due to the bankruptcy and related issues, it is unlikely that Eagle West will offer any type of broadband service in the near future.

7.2.14 GiGoNET

GiGoNET is a dial-up ISP headquartered in Florence. In addition to Florence, they provide dial-up service to Arizona City, Valley Farms, Arizona Farms, Cactus Forest, Caliente, Casa Grande, Coolidge, Country Thunder area, Dahlia Farms, Eloy, Florence Gardens, and Maricopa. GiGoNET is in the midst of planning to offer high-speed wireless service to their customers, starting in Florence. To do this, an application has been submitted to the County. The Florence Town Council unanimously approved the erection of the needed 150 foot tower south of Florence on land already acquired by the owner. They are still waiting for approval by the County so that they can complete the process of securing funding, and tower erection for the expansion of services.

Products and Pricing
Although products to be offered and pricing is still in the planning stages, preliminary thoughts are to offer speeds of 256 Kbps upstream and 1.5 Mbps downstream. Initially, there will be no installation fees. Residential rates will be in the $40 to $50 range per month and business rates will be dependent on the amount of bandwidth desired. Customers and non-customers alike are consistently calling each week asking when high-speed internet will be available.

Contact: Tom Harberts
520.868.9469
tom@gigonet.com
www.gigonet.com

7.2.15 Mediacom of Arizona

Mediacom provides digital and soon will offer HDTV cable television service primarily to residential households in Apache Junction, Gold Canyon, Queen Valley and Queen Creek. Mediacom has recently completed an upgrade to their cable system. This has enabled them to offer high-speed internet service to the permanent household population and offers a vacation plan for snowbirds.

Current Infrastructure
Mediacom has recently completed an upgrade to their cable system. It currently does not have its backbone on Apache Trail, one of the major streets where businesses are located. Actual throughput (using a pcpitstop.com test) was 1067Kbps to 2224Kbps downstream and 246Kbps upstream. Mediacom advertises downstream up to 1.5M and up to128K upstream.

Future Plans
Mediacom is in negotiations to add local broadcasters' HD (CBS, ABC, NBC, Channel 3, and PBS) as soon as possible and Fox sometime in 2004. The HD option will cost $11 per month.

Products and Pricing
Digital cable television pricing ranges from $42.95 for basic cable to $54.95 digital cable; premium groups and packages are available at additional costs. Ten digital basic channels have recently been added to the channel line-up as well as additional feeds of HBO, Showtime, Sundance and Starz!

Residential internet service is priced at $40.95 per month if you are a cable TV customer and $50.95 if you are not. Customers can rent a modem or use one they have purchased.
Several business high speed packages are available and range from $79.95 to $249.95 depending on the needs of the business.

Contact: Paul Tremblay, Jr., Area Marketing Supervisor,
480.474.2085
www.mediacomcc.com

7.2.16 McLeodUSA

McLeodUSA (www.mcleodusa.com) is a competitive telephone company headquarted in Cedar Rapids, Iowa, which provides local service in Arizona through resale agreements with Qwest, as well as long distance and full data service on their own fiber. A 2001 McLeodUSA map (Appendix K) illustrates their network of 38 ATM switches, 44 voice switches, 604 colocations and 435 DSLAMs. The Company provides integrated communication services, including local service, in Arizona and 23 other western states.

Products and Pricing
In Gila and Pinal Counties, McLeod offers DSL service only in Apache Junction. The following services are available throughout both counties: Frame Relay; Dedicated Internet; Dial Internet; Private Line; and Remote Access VPN.

Dial-up internet service starts at $19.95 per month with discounts for customers also taking local or long distance service. DSL speeds include IDSL (144 Kbps), ADSL (384 to 1024 Kbps) or SDSL (384 Kbps to 1024 Kbps). High-speed connections are available at T-1 or DS3 speeds, ranging from 128 Kbps to 45 Mbps. Prices begin at $37.95 per month for the ADSL 384 Kbps speed.

Note: [In response to a query by a CTA Partnership committee member, the following information is included in this vendor description:] Early in 2002 McLeodUSA's heavy debt load led it to file for bankruptcy reorganization, followed by shedding several of its non-core businesses, including its wholesale ISP, directory publishing, and customer premises equipment units. The Chapter 11 filing included only the parent company, McLeodUSA Incorporated, and did not extend to any of the operating subsidiaries, including McLeodUSA Telecommunications. McLeodUSA emerged from banruptcy in April of 2003.

Contact:McLeodUSA Customer Care, 1.800.593.1177

7.2.17 Peak Speed Communications, Inc.

Netbeam is a fixed wireless broadband provider headquartered in Breckenridge, Colorado. It has just received a capital investment of $569,000 from Rock Solid Communications and other investors, enabling it to emerge from Chapter 11 bankruptcy protection and merge with Peak Speed Communications, Inc, a Breckenridge, CO provider of engineering and carrier services to the fixed wireless broadband industry. Rock Solid Communications is a competitive local exchange carrier (CLEC) in Colorado and is planning to apply for CLEC status in Arizona, Utah and California. This means that Netbeam/Peak (via Rock Solid) will potentially be able to offer voice services as well as high speed Internet services to its customers. An arrangement with Time Warner Telecom in Tucson enables Netbeam to cross the 520/602 LATA borders.

Rock Solid has recently bought BroadBand West serving Aspen to Grand Junction. Upon confirmation of its reorganization plan, Netbeam will merge with Peak Speed Communications and will begin to aggressively market its high-speed internet products to communities in Arizona, Utah and Colorado.

Peak Speed is extremely interested in establishing a public/private partnership with the County and local government entities to expand their network. They would like this partnership to utilize government as anchor tenants plus add economic development funds and private sector participation into the mix to achieve the business feasibility model threshold required to expand services into a community. With the backing of Rock Solid, Peak Speed is not only the largest fixed wireless broadband carrier west of the Mississippi, it is also the best capitalized and the only FWBB carrier with access to CLEC facilities.

Current infrastructure
Peak Speed's wireless signals cover just about all of Casa Grande and Coolidge, in addition to customers in Cochise (Sierra Vista, Hereford) and Santa Cruz (Nogales). The primary antenna site in Casa Grande is a 360° four sector cell located on one of the tallest buildings in the Casa Grande area. Additional cell sites are located in the central part of Casa Grande as well as the Southern and Northern extremes of the city. There is approximately 140 square miles of coverage in the Casa Grande area.

Peak Speed currently has an antenna site in Coolidge and is offering high-speed internet service to the city. They are negotiating with the Regional Fire District whereby the Fire District will receive free service in return for location of an antenna on Fire District property. When the Fire District expands towards Maricopa, a similar arrangement is expected with regards to antenna placement/free service.

Future Infrastructure
Future plans for Pinal County are to install an antenna site on the top of the regional hospital in Casa Grande. In addition, Peak Speed plans to expand its network into the Eloy, Arizona City and perhaps Florence areas. The company has been negotiating with the City of Eloy to put an antenna on the water tower to cover the city and the new housing development. Products that might be offered in Eloy include internet and video through wired or wireless technology.

Arizona City is believed to have pent up demand; therefore Netbeam would like to explore the possibility of putting an antenna on the new County building for shared municipal and private use. Netbeam would like to expand into Florence but needs a location there where an antenna could be 60 to 70 feet above ground level.

Products and Pricing
As a result of its partnerships with Rock Solid Communications and Time Warner Telecom, Peak Speed is planning to offer very high speed internet (17 Mb downstream/6 Mb upstream) including digital voice services. The reduction of wholesale prices of equipment and increased competition is expected to enable residential customers to be able to enjoy access to very high speed internet service for prices in the $39-$49 per month range with upfront installation costs of $69-79 plus one month's service fees in advance. Business installation fees will begin at approximately $149.

Digital Voice Service (VOIP) pricing is still being firmed up but could be as low as $29 per month for residential service (including all long distance and with features such as voice mail, call waiting, call forwarding, conference calling) $59.95 *per seat* for businesses (subject to local tariffs and regulatory matters).

Contact: Gregory Friedman
970.389.3250
gaf@peakspeed.com
www.netbeam.net
www.peakspeed.com

7.2.18 Orbitel Communications

Orbitel Communications is a new, locally owned cable television and internet service provider serviced by Cable Systems Services. The Company provides 157 channels of digital cable television plus high-speed internet service to the sub division of Rancho El Dorado, located northeast of Maricopa in Pinal County.

Current Infrastructure
The Rancho El Dorado cable system is a new build with an 860MHz fiber coax backbone and an average of 150 homes to the node.

Future Plans
The Company recently added HDTV service to 7 local channels, increased internet speeds and is considering adding VOIP in the future. Orbitel is possibly expanding to other communities in the very fast growing Maricopa area.

Products and Pricing
Orbitel's current channel breakdown is: 22 Expanded Basic, 40 Digital Basic, 32 Digital Premium, 30 Digital Music and 18 Digital pay-per-view for a total of 157 channels with programming on them. Basic Cable costs $23.95 per month; digital basic is an additional $19.95 and premium channels start at $9.95 per month. Pay-per-view starts at either $3.95 or $7.95; special events are priced according to the event offered. Package prices are also available.

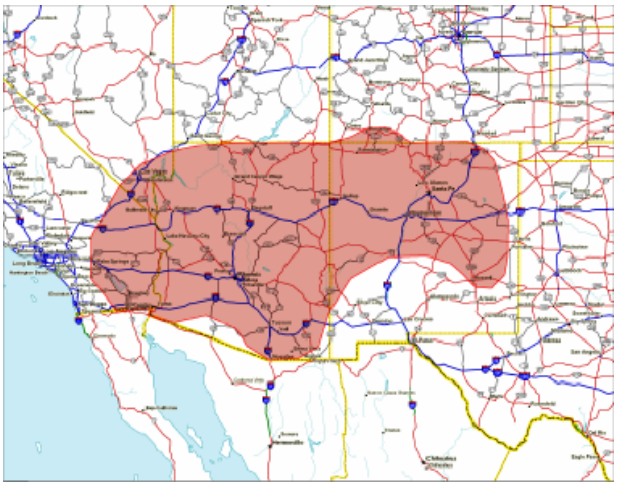
Internet service can be purchased at 128 Kbps upstream and downstream for $24.95 or at the higher speed of 1000Kbps downstream and 256Kbps upstream for $39.95 per month. Cable modems can either be purchased or leased from Orbitel.

Contact: Todd Anderson, VP Cable Operations
800.247.1566
tanderson@cablesystemservices.com
www.orbitelcom.com

7.2.19 Telespectra

TeleSpectra LLC (established 1999) provides wholesale and retail wireless broadband services to residential and small to medium businesses in rural markets. The Company is a result of a merger and acquired assets from companies such as MCI/American Television Relay who have been operating telecommunications networks in the southwest for almost 50 years. Current enterprise clients include T-Mobile, Cable One, Cellular One, Comcast, NPG-Cablevision, Nextel, Northern Arizona University, Central Arizona College and Winstar.

Current Infrastructure
The TeleSpectra Network Backbone is comprised of a Fiber Optic Phoenix Core and licensed Microwave to the remote regions of the southwest. Operating in accordance with FCC regulations, all Microwave paths are engineered and coordinated to ensure maximum up-time with limited interference.



Future Plans
TeleSpectra's broadband internet access is currently available in the Scottsdale Airpark and Wellton, Arizona. Service should be available to Yuma in February 2004. By the end of 2004, TeleSpectra will also have general availability for broadband internet access in the White Mountain Region, Grand Canyon Region, and Nogales Region.

Products and Pricing
Residential customers can receive bandwidth at 256 Kbps or 512 Kbps with monthly charges of $45.95 and $85.95 respectively. Installation and activation fees start at $50. Business customers have a choice of 512 Kbps or 1+ Mbps with monthly rates starting at $85.95 and installation/activation charges starting at $200.

TeleSpectra also offers transport and access products for: video, long distance, cellular backhaul, high capacity, distance learning, telemedicine, and E-rate applications. In addition, the Company can provide full service broadcast quality transmission for uplink and downlink applications.

Contact: Daman Wood, Senior Sales Representative
602.648.5843
dwood@telespectra.com
www.telespectra.com

7.2.20 The River

The River Internet Access Company, headquartered in Tucson, has been in business since 1995. Through acquisitions of Sierra Internet, Innovative Systems Design, First Internet Alliance, gila.net, fiaaz.net, oz.net, Bainbridge.net, and Serv.net, The River has grown to be one of the country's largest independent ISPs and maintains a local presence with over 20,000 customers in Arizona and Washington. It offers nationwide dialup access at no extra cost, and worldwide access is available through the iPass network.

The River provides Internet service to customers in Globe, Hayden, Payson, Pine, San Manuel, Tonto Basin and Winkelman in Gila County and to Casa Grande, Kearny and Superior in Pinal County. In addition, The River has large concentrations of customers in Tucson, Phoenix, Sierra Vista, Nogales and Yuma in Arizona and in Seattle, Washington.

Current Infrastructure
Through partnerships with Qwest, New Edge Networks and Verizon, The River has a very robust network consisting of T-1s, multiple DS3, a 100 Mbps Ethernet and an OC3. This network provides for redundancy, connecting facilities in Tucson, Seattle and Phoenix through a ring of private DS3 circuits. The OC3 into The River's Tucson Point-of-Presence (POP) is split into 3 DS3s connecting to the Qwest ATM/DSL network, the Qwest Frame Relay network and the third, a private DS3, connecting The River's facilities in Tucson and Phoenix. A diagram of this network can be seen in Appendix H.

Their Seattle facility is also home to an all-new, state-of-the-art server farm, developed to replace separate Email, WWW (Web), DNS and Authentication servers with a fully-redundant, highly-available cluster of servers. This new server farm consists of many individual servers, with fully redundant load-balancing and routing equipment, all networked to an industrial-grade EMC Celerra mass-storage subsystem (based on their "five-nines" Symmetrix platform, used by financial institutions worldwide) for the most robust data integrity, availability, and redundancy available.

Future Plans
The River is aggressively expanding its DSL services, focusing on areas where Qwest is installing new DSLAMs into central offices. In the past year they have added national dial-up access and a sophisticated Spam and virus filtering services. The River has recently added satellite access and a "dial-up accelerator" package to better serve markets where broadband options are limited.

Products and Pricing
The River offers dial-up or ISDN internet access (starting at $22.95 per month for nationwide service). The Company partners with New Edge Networks, Qwest and Verizon to offer DSL in the following towns:

- Tucson/Green Valley
- Phoenix

- Sierra Vista
- Yuma
- Prescott
- Western Washington
- Nogales
- Flagstaff
- Seattle

Most dialup, ISDN, and DSL service plans include 5 email addresses and spam/virus filtering. Dialup Accelerator is available as an option. Frame Relay is available in most markets at speeds of 56kbps to 1.536Mbps (T-1). Web hosting, static IP addresses, domain email spooling, co-location and data transit without co-location are also available. Technical support is 24x7 and is included for free on most service plans.

DSL speeds offered are 192Kbps, 256Kbps, 384Kbps and 768Kbps. DSL pricing ranges from $39.95 to $80.00 per month (including DSL provider fees) with set up charges ranging from $50 to $349. Residential rates are on the lower end of the scale and business rates on the upper end. Satellite service is available in all areas.

Contact: Marcus Needham, Vice President Development
1.877.887.4837
marcus@theriver.com
www.theriver.com

7.2.21 Triad Wireless

Triad is a wireless ("WiFi") company owned by Codisys3 Technologies, headquartered in Phoenix, Arizona. They have started to build their wireless network in the Apache Junction/Gold Canyon areas, and have "lit" the network in the Gold Canyon RV Park (600 mobile homes/150 RV lots).

Current Infrastructure
Triad has multiple antennas located at the Gold Canyon RV Park. The wireless signal can reach distances up to 1/2 mile from the main building antenna array. Connectivity is brought through

frame-relay point-to-point lines to Triad Wireless' main office where authentication is achieved before being sent out through the security firewall and then the public internet via T-1's. There are also backup internet lines in case the main DIA (dedicated internet access) goes down. Service may also reach some outlying areas as well with good line-of-site to the antenna. The infrastructure equipment is monitored 24/7/365 by remote management software that alerts the Company about errors, high traffic and planning for future needs.

Future Plans
Triad is concurrently building a wireless system in Las Vegas, Nevada that will be "lit" in January, 2004 and the Company is looking into the feasibility of building a wireless network for a high rise apartment building in the Phoenix corridors.

Products and Pricing
Residential service at 256K (with a mailbox) starts at $34.95 per month; 512Kbps is $44.95. In addition, a residential customer may purchase encryption and additional mailboxes.

Business customers can receive from 256Kbps downstream speed up to 1 Mbps (higher speeds are available on request in some areas) with base prices ranging from $49.95 to $159.95 per month. Additional domain names, mail boxes and a VPN within the network are also available.

Contact: Rory Conaway, Chief Executive Officer
602.757.2741
rconaway@triadwireless.net
www.triadwireless.net

The following tables summarize the cable television providers showing markets served, product offerings and pricing.

LOCAL INFRASTRUCTURE PROVIDERS

	Provider	Markets	Products
0	Qwest	All markets except Gila River	DSL, Dial Up
1	AZT-1	Eloy, Toltec	Wireless
2	C2i2	Casa Grande	Dial Up
3	CableAmerica	Coolidge, Florence	Digital TV, BB Modem, VOIP (future)
4	CableONE	Claypool, Globe, Miami	Digital TV, BB Modem, HDTV
5	CableVision	Payson, Star Valley, Oxbow, Round Valley	Digital TV, VOIP (future)
6	Canyon Broadband	Payson, Star Valley, Round Valley, Pine/Strawberry (future)	Wireless
7	Casa Grande Internet	Arizona City, Casa Grande, Coolidge, Eloy/Toltec, Florence	Dial Up; DSL (Casa Grande, Coolidge)
8	CopperNet	Claypool, Globe, Kearny, Miami	Wireless
9	Cox	Casa Grande	Digital Video, BB Modem (6/04)
10	Cybertrails	Apache Jct, Arizona City, Casa Grande, Coolidge, Eloy/Toltec, Florence, Globe, Miami, Payson, Pine, Stanfield, Star Valley, Strawberry	Dial Up, Wireless (Casa Grande, Payson)
11	Eagle West	Arizona City, Eloy/Toltec, Florence Gardens, Kearny, Superior	Cable TV (analog)
12	GiGoNET	Arizona City, Arizona Farms, Cactus Forest, Caliente, Casa Grande, Coolidge, Country Thunder, Dahlia Farms, Eloy, Florence, Florence Gardens, Maricopa, Valley Farms	Dial Up, Wireless in future (Florence)
13	McLeod	Dial-up in all communities; DSL in Apache Junction	Dial Up, DSL
14	Mediacom	Apache Jct, Gold Canyon, Queen Creek, Queen Valley	Digital video, BB modem, HDTV (future)
15	Orbitel	Rancho El Dorado	Digital video, BB modem, HDTV
16	Peak Speed	Casa Grande, Coolidge, Arizona City, Eloy, Florence (future)	Wireless
17	Telespectra	Central Arizona College	Wireless
18	The River	Globe, Kearny, Payson, Pine	Dial Up
19	Triad Wireless	Gold Canyon, Apache Jct (Future)	Wireless
20	GRTI	Gila River Reservation	DSL, Dial Up
21	SACTUI	San Carlos Apache Reservation	Dial Up

INFRASTRUCTURE OPTIONS

Community	Video	Cable Modem	DSL	Wireless	Dial Up	VOIP
GILA COUNTY						
Payson/Star Valley	CableVision (D)	CableVision		Canyon Broadband	Cybertrails, McLeod, Qwest, The River	Future-Cablevision
Pine/Strawberry				Future-Canyon Broadband	McLeod, Qwest	
Globe/Claypool/Miami	CableONE (D)	CableONE		CopperNET	Cybertrails, McLeod, Qwest, The River	
PINAL COUNTY						
Apache Jct/Gold Canyon	Mediacom (D) Future-HDTV	Mediacom	McLeod	Triad Wireless – Gold Canyon	Cybertrails, McLeod, Qwest	
Arizona City	Eagle West				Casa Grande Internet, Cybertrails, GiGoNET, McLeod, Qwest	
Casa Grande	Cox	Cox – 6/'04	C2i2; CG Internet	Peak Speed	C2i2, CG Internet, Cybertrails, GiGoNET, McLeod, Qwest	Future-Cox digital phone
Coolidge	CableAmerica (D)	CableAmerica	CG Internet, Qwest	Peak Speed	CG Internet, Cybertrails, McLeod, Qwest	'04-CableAmerica w/Vonnage
Eloy/Toltec	Eagle West			AZT-1	CG Internet, Cybertrails, GiGoNET, McLeod, Qwest	
Florence	CableAmerica (D)	CableAmerica	Qwest	GiGoNET in '04	CG Internet, Cybertrails, GiGoNET, McLeod, Qwest	'04-Cable America w/Vonnage
Gila River	Orbital (D)	Orbital – Rancho El Dorado				Future - Orbital
Kearny	Eagle West			CopperNET	CopperNET, McLeod, Qwest, The River	
Superior	Eagle West				McLeod, Qwest	

8.0 NEEDS AND ASSETS ANALYSIS

Community meetings were held in Florence, Globe and Payson to discuss and provide input for the development of the Community Telecom Assessments. In addition, local newspapers wrote articles about the planning process, and the survey conducted was posted on the Pinal County web site.

The objective of these community meetings was to provide and collect:

- An overview stating the purpose of the State of Arizona's Community Telecom Assessments
- An outline of the telecom planning process
- Possible outcomes and impact to the community
- An opportunity to participate in the planning process
- Provide input as to community telecommunications priorities
- Data regarding the state of telecommunications services

Agendas, presentations and materials used in the meetings can be found in Appendix B along with newspaper articles.

In addition, team members conducted one-on-one interviews in as many cities/towns as feasible with people representing the government, medical, educational, library and business communities.

The project team feels these meetings and subsequent one-on-one interviews were a valuable part of the overall process. Information gained through these meetings and user survey questionnaires was used to establish a "demand-set" of telecommunications services for the area. Additionally, this information was used to help establish telecommunications networking priorities for the region. What the surveys indicate is that fast reliable access is an important issue to public offices, private businesses and individuals in both counties and is an important element in managing growth.

8.1 TELECOM SURVEYS – QUANTITATIVE

8.1.1 Survey Results

Through public meetings and telecom surveys, public, private and non-profit offices are saying that their primary telecommunications goal is to access greater bandwidth capacity over the next five years to support and improve their current work processes as well as future growth. Telecommunications surveys were distributed via "inserts" into Casa Grande's July water bills. In addition, surveys were available on the Pinal County web site, in all town/city halls, county complexes and Circle K markets. As mentioned above, public offices, libraries, educational

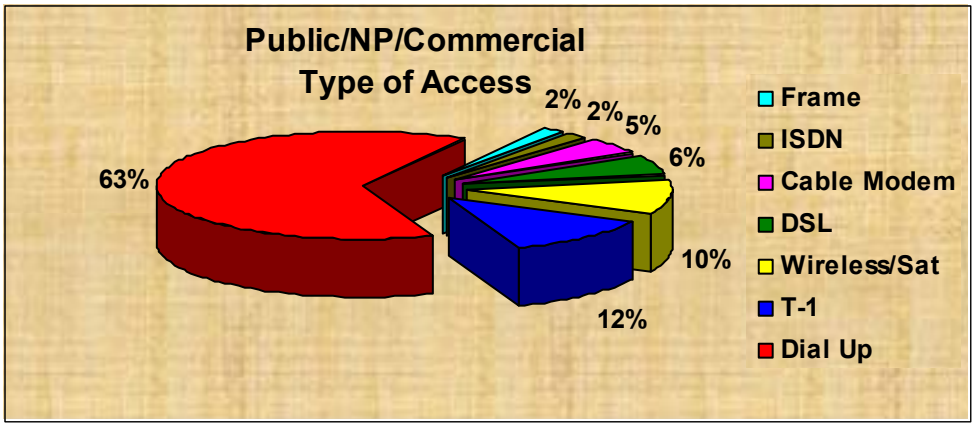
institutions and medical institutions were interviewed and key businesses were contacted urging them to complete and send in the survey.

Surveys by City Grouping	
Apache Junction	74
Arizona City	6
Casa Grande	372
Dudleyville	1
Eloy/Toltec	50
Florence/Coolidge	29
Gila River Indian Cmty/Sacaton	2
Globe/Miami/Claypool	26
Hayden/Winkelman	2
Kearny	11
Mammoth	1
Oracle	10
Payson/Pine/Strawberry/Star Valley	107
San Manuel	2
Stanfield	1
Young	1
Total	**695**

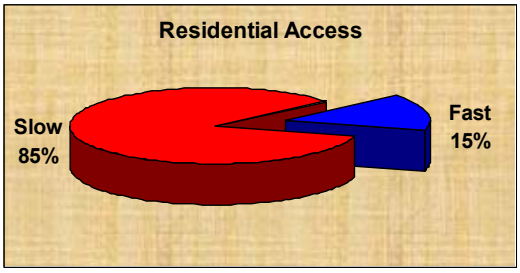
Surveys By Sector	
Public/Non Profit Sector	34
Private Sector	73
Home Office	37
Individuals	551
TOTAL	695

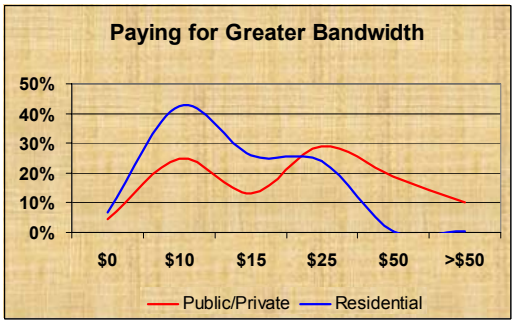
These efforts generated 695 surveys from the public and private sectors of the local economy as well as individuals. It should be noted that the quantity of public surveys is understated due to the large number of public and non-profit sector one-on-one interviews with project team members. Even so, the total number of surveys returned from the two counties represents 7% of the total households and businesses, a significant sample size.

The chart below shows that, of public/private survey respondents, 63% are still using dial-up technology. In both the public and private sector, if high-speed access is critical to running the entity, it has contracted and paid for a T-1 line or a wireless (803.11b or satellite) solution. Of respondents who said that they have Internet access, 89% said that Internet access is critical.



Households are primarily using dial-up accounts to access the Internet. This is not surprising since higher-speed options are either not available or have costly equipment and monthly fees. Three-quarters of the households with a "Slow" connection are interested in faster speed. Interestingly, 16% of those respondents saying they have a "Fast" connection are interested in yet a faster connection.





However, 75% of the households are willing to spend only $15 or less more than they are paying now for their Internet access. In the Public/NP/Commercial sectors, about 70% of respondents would be willing to pay $25 or less extra per month for faster speed. A few companies pay up to $300 per month more for the bandwidth they need.

8.1.2 Satisfaction with Service Providers

The following table shows satisfaction values across respondents with a scale of 1.0 (Very Satisfied) to 5.0 (Very Unsatisfied). Respondents are in the "Satisfied" to "Neutral" range with their current service providers for phone, cell phone, cable modem and Internet service, with satellite television scoring the best and satellite delivered data the worst.

Service Provider	Public/NP/Comcl	Residential	ALL
Local Phone	2.6	2.5	2.5
Long Distance	2.2	2.2	2.2
Cellular Telephone	2.4	2.4	2.4
Cable TV	2.7	2.6	2.6
Satellite TV	2.2	2.0	2.1
Cable Modem	2.8	2.7	2.7
Satellite Data	2.7	2.9	2.9
Internet Access	2.6	2.8	2.7

However, comments provided by respondents unhappy with many of their local service providers were rather strong as evidenced by the sample comments in Section 8.2.

8.1.3 Bandwidth Usage

Survey respondents showed interest in the qualities and applications of bandwidth usage as follows (ranked by number of responses):

Top 5 Residential	Top 5 Public/NP/Comc'l
1. Faster Speed	1. Faster Speed
2. E-Mail	2. E-Mail
3. Research/Surfing	3. High Speed Data Transfer
4. High Speed Data Transfer	4. Research/Surfing
5. Distance Learning	5. Voice over Internet Protocol

Three-quarters of all respondents ranked "faster speed" as the most desired quality they required from their Internet access provider. Email was the application used by almost 70% of all survey respondents. A full listing of attributes/applications desired, in priority order are:

1. Faster Speed
2. E-mail
3. Research/Surfing
4. High Speed Data Transfer
5. Distance Learning
6. VOIP
7. Web Hosting/E-commerce
8. Training
9. Data Back-Up
9. Video Conferencing
11. Link Multiple Physical Location
12. Tele-Medicine
13. Video Arraignment
14. GIS Data Sharing

8.2 TELECOM SURVEYS – QUALITATIVE

Comments from citizens contribute to being able to really understand current frustrations and future needs with regard to telecommunications access. Here are a few comments from the surveys:

> "Qwest is the sorriest excuse for a telecommunications company that there should ever be allowed to exist." *Payson Business*
>
> "Qwest is not the best and lacks good customer service." *Globe/Miami Business*
>
> "Cable TV services are terrible – that's why we do not subscribe." *Payson Business*
>
> "Our frustration with slow speed on the Internet drove us to spend extra $$ to install wireless in one building. Couldn't be more satisfied. DSL and Cox Cable are too late getting here!" *Casa Grande Business*

> "Typical [dial-up ISP] problems are loss of Internet connection, difficulty connecting, long e-mail and data transfer times and multiple tries to successfully transfer data." *Payson Non Profit*

Applications are what drive the need for high-speed access. The following are a few examples of how the respondents will use a high-speed connection.

> "I would like high-speed connection to enhance my husband's home-based business. [This] includes research communication via e-mail. Also would like ability to do e-commerce and web hosting." *Pine/Strawberry SOHO*

> "Since we are a real estate company, all of our MLS is now on the Internet along with the title companies and County information as well. Almost everything we do pertains to the Internet one way or another. This service would be a very valuable asset to my business as all of Pinal County is in growth frenzy and we need to have this in place and ready to go as we grow." *Apache Junction SOHO*

> "If we had high speed access with a static IP, we would e-mail on our VPN and we could utilize our company's web site for downloading larger files (10+ MB). It would save us the cost of mail/UPS of training manuals, teleconference rates, etc. We may even be able to start doing video conferences for our management teams." *Payson Business*

> "Dial-up [is] too slow. With the growing popularity of broadband Internet, web sites have become much larger, taking longer to access….I would use high-speed Internet for surfing, downloading music and on-line multi-player gaming." *Payson Resident*

> "To give me high-speed Internet access is like giving me gold. Currently, it takes me at least an hour to check my e-mail. This is not because of spam – no, this is because it takes anywhere from 5 to 10 minutes to load just one page! I have plans to build an e-business. I am going to school to learn how to design web pages. Once I get this task accomplished, I want to design web pages as my own e-business. If I had high-speed access, I could do this with more ease and I know I would be successful. The current speed (56k) is too slow. Bring on the high-speed Internet!" *Arizona City Resident*

A full summary of survey results and comments by respondents are in Appendix C. A notebook of completed surveys organized by public entities, private businesses and individuals is available at the Gila and Pinal County offices.

8.3 PROJECTED MARKET DEVELOPMENT

The project team feels that many of the communities in Pinal and Gila Counties have just started on their path up the telecommunications growth curve and that demand for improved broadband access will continue to grow for years to come.

Demand for applications and services will also be a function of software and equipment and, as long as reasonably priced capacity is available, applications and services should not be an issue. Future applications the counties will "grow" into include advanced voice services, video-conferencing, video arraignment, high-speed data transfers, Virtual Private Networks, transparent LAN services, electronic town hall meetings, electronic voting, and other applications not yet created.

Businesses located in the Casa Grande and Payson areas especially are demanding and will continually demand greater capacity at faster speeds and advanced telecommunications services, via wireline or wireless technology. A new generation of applications such as county security applications and e-government services needs to be deployed.

It was notable that 26% of the public/non-profit/commercial respondents were what are called either "Lone Eagles" or SOHO. That is, these are small businesses run out of a home office. These businesses choose to move to rural areas for security and lifestyle reasons and are more and more dependent on broadband access services to be able to compete effectively while expanding the counties' economic base.

In addition, a good number of residential respondents mentioned the growing need for high-speed Internet access to keep up with latest developments in their jobs, for continued work-related education, for school projects, or to be able to telecommute.

> "I am going to school, but couldn't get on-line or was immediately bumped off." *Casa Grande Resident*

> "I am looking for a high-speed alternative to give me the ability to work from home. I work in Chandler – if I could work from home 1-3 days per week, I would save money for gas and also the wear on my vehicle." *Casa Grande Resident*

> "…With three college students, the Internet has become an important part of our everyday lives. With a faster communication system there would be less time on the Internet and more time spent as a family. Thanks for listening." *Eloy Resident*

9.0 POTENTIAL REVENUE PROJECTIONS

9.1 METHODOLOGY TO DETERMINE POTENTIAL TELECOM MARKET

Revenue = Price x Demand

A revenue assessment is ostensibly very simple — one just needs to multiply prices by demand to yield revenue. Price ranges are determined by looking at comparably priced services in the relevant city, county, in Phoenix and industry-wide.

Demand Estimates and Projections

The demand side of the equation is a little trickier. In order to aggregate the bandwidth needs of the County we need to know who will buy what demand of the various levels of bandwidth that might be offered.

One should note that we have categorized this bandwidth by *high, medium* and *low*. We have established these categories to recognize that what we consider high, medium and low today will have a totally different definition in ten years.

BW	Now	2015
High	1.5 Mb+	100Mb+
Med	256-512Kb	24-50Mb
Low-Med	128Kb or less	1.5Mb or less

Our current definition is that "high" is 1.5 Mb/s or greater, "medium" is 512 Kb/s and "low" is 128-256 Kb/s. A telecom "think tank" study by Dr. Lawrence Vanston called *The Local Exchange Network in 2015* looks at a probable scenario for telecommunications in the future. His advisory board included input from Verizon, SBC, Bell Canada, BellSouth, Sprint and Qwest. The report suggests that, by the year 2015, "high" bandwidth will be 100 Megabits per second and above; "medium" will be 6-24 Mb/s and "low" will be 1.5 Mb/s and lower.[32]

Residential demand

Population and household data estimates and projections for each community are based on U. S. Department of the Census (census 2000) and official State data sources.[33] A recent Northern Arizona University study, *Grand Canyon State Poll,* stated that 76% of the respondents have access to the internet.[34] The study also commented on the relationship between household income and internet access.

To be able to establish a "starting point" for internet access for each city, an index was created based on the relationship of each community's median household income compared to the State of Arizona. This index then is used to interpolate an estimate of the percentage of households

[32] Lawrence K. Vanston, Ph.D., *The Local Exchange Network in 2015*, Technology Futures, Inc., 2001. http://www.tfi.com/pubs/2015.html
[33] http://www.de.state.az.us/links/economic/webpage/popweb/index.html
[34] *Grand Canyon State Poll,* Northern Arizona University Social Research Laboratory, April 17, 2002. *http://www4.nau.edu/srl/News/04-17-02.pdf*

with internet access in each community. Because the financial model analyzes the "clusters" of communities specified at the end of Phase I of this project, each community in the cluster's percentage (of internet access users) is weighted by its number of households to yield an overall percentage of internet access for the total households in the cluster. This percentage is increased over the ten-year period depending on the characteristics of the particular market cluster.

The bandwidth accessed by households is segmented into *Medium, Low,* and *Dial-Up* households so that the appropriate pricing can be applied to yield revenue projections. Bandwidth has not been designated by absolute demand (*e.g.* 256Kbps or 1.544Mbps) because we believe that bandwidth, over a ten-year period of time will become commodity-like similar to what has happened with the cellular telephone industry. As the cell phone industry matured, providers offered a greater demand of minutes for the same monthly fee to protect their revenue stream. Projections for *medium* and *low* residential bandwidth demand was estimated by the project team based on the existing infrastructure, discussions with existing providers, and industry-wide research, such as the *Technology Futures, Inc.* white paper.

Public/Private/Nonprofit Demand

This category includes the "big users" of large amounts of bandwidth; therefore we need more specific input from these potential bandwidth customers. A database of all the private and public businesses in the County, by municipality was developed (using *Dun & Bradstreet* primary data). A team consisting of representatives from the County, some municipalities, Central Arizona College, and Manweiler Telecom identified key businesses (by industry) in each city/town. A growth factor was assigned to each community based on the characteristics of the community (*e.g.* income level, broadband availability, historical growth rates, support of local government and community leaders). For example, the 1,700 entities in Casa Grande are projected to grow 10% per year as businesses spread south from Phoenix and broadband becomes readily available.

Information collected from the telecom survey results, interviews with government, educational, medical, private business and bandwidth vendors was used to estimate what bandwidth businesses have now and will most likely need in the future. These quantitative results (bandwidth by category – high, medium, low) were then fed into the revenue model along with the up-to-date population projections, business growth and industry statistics customized to meet the specifics of the telecommunications environment in Pinal County and Gila County.

Demand Results

The result of the above calculations is the projection of the number of households or firms buying various levels of bandwidth over the next ten years (see financial model in Appendix I). One should note that we are projecting that the "mix" of bandwidth will also change over the ten-year period. As greater bandwidth becomes available at affordable price points; dial-up access becomes almost obsolete.

9.2 PROJECTED MARKET DEMAND (REVENUES)

The primary issue with "take rates" or how many firms (or households) will buy a high-speed connection is the pricing levels – how affordable the services are for the long term. We have assumed that pricing for public and private entities will start at rates currently being offered by the more competitively priced high-speed access providers in each of the communities. Over time, we are predicting that prices will *decrease* as either competition increases and/or the wholesale cost of the bandwidth decreases. By year 6, we assume that equipment fees will be included in the monthly service price.

Using the above assumptions for quantities bought and pricing schedules, the following table displays potential total high-speed revenue potential for the community clusters (amounts in thousands of dollars).

	Year 1	Year 3	Year 5	Year 10
GILA + PINAL COUNTIES				
Gila County	$ 3,017	$ 3,650	$ 4,820	$ 7,292
Pinal County	5,378	10,551	15,174	22,625
TOTAL	$ 8,395	$ 14,200	$ 19,995	$ 29,917
GILA COUNTY				
Globe/Claypool/Miami	$ 873	$ 1,038	$ 1,243	$ 1,555
Payson/Pine/Strawberry/Star Valley	2,144	2,612	3,578	5,737
TOTAL GILA COUNTY	$ 3,017	$ 3,650	$ 4,820	$ 7,292
PINAL COUNTY				
Florence	$ 222	$ 312	$ 419	$ 624
Casa Grande/Arizona/Coolidge/Eloy	2,428	6,031	9,162	13,855
Apache Junction	2,473	3,928	5,202	7,585
Gila River (Sacaton)	87	79	82	86
Kearny	135	153	178	228
Superior	33	48	131	247
TOTAL PINAL COUNTY	$ 5,378	$ 10,551	$ 15,174	$ 22,625

So what options does this information generate?

1) Private providers can insert the projected revenues into their cost models to determine whether or not they want to provide service in the County.
2) Community clusters and/or counties may, individually or jointly, put out a Request for Proposal that quantifies the revenues for the public entities as anchor tenants and potential revenue throughout the county(s).
3) The county(s) may decide to build a backbone network in a portion of the county and, with the development of the cost structures for various technology options, could determine whether the investment in a telecommunications infrastructure makes sense.
4) This information could provide the impetus for incumbent providers (telephone, cable, ISPs) to enhance their facilities and services provided.

10.0 CURRENT TECHNOLOGY/TELECOM NEEDS

10.1 CITIES/TOWNS/COMMUNITIES/TRIBAL RESERVATIONS - GILA COUNTY

Gila County – Gila County covers a geographic territory of 4,752 square miles and ranges from a desert environment at 2,000 feet to an alpine ecology at over 7,000 feet in elevation. Mining, ranching, tourism and recreation are the major economic industries in Gila County. In spite of the large geographic boundaries, only 3.7 % of the land mass is privately owned. Globe, in central Gila County, is the county seat. Payson is the largest population center in Gila County and is situated at the northwestern corner of the county. Population is concentrated in the Globe/Miami area and Payson. Other, smaller communities include Hayden and Winkelman in the southern region, Young in the northwest, and Strawberry and Pine north of Payson. Gila County has a T-1 Internet connection. There are multiple T-1's going to the entry point to the net due to other traffic that rides through that point in their net, but the county's internet connection is a T-1. Gila County does employ GIS and maintains a web presence. The county has plans to expand its active use of this technology as well as increased access to state and federal data bases. Current broadband usage is high and future demand is anticipated to continue to be high.

Globe – Globe is the county seat of Gila County and site of major mining interests. Globe was established as a mining town in 1876. The city was incorporated (the third and final time) in 1907. Globe is located in the Pinal Mountains of southern Gila County at an elevation of 3,500 feet on U.S. Highway 60, a major transportation corridor. The city hall has a local area network, with most computers wired for internet access. Desired applications include GIS, an interactive city web site for obtaining permits and licenses, and higher speeds to facilitate online applications for reports, grants and data collection. The police department would like laptops in cars with secure wireless data connectivity to access real-time data bases. The city indicated it lost a potentially significant economic development project when current local exchange carrier was unable to provide 300 lines for a proposed customer fulfillment center. The city is planning to construct a microwave tower to address gaps in current radio communications for public health and safety personnel. Mobile telephone coverage is deemed 'adequate' for current purposes. Current bandwidth needs – high. Future bandwidth needs – high.

Hayden – This is a small town (pop. 890) located 35 miles south of Globe on state highway 177. Named for Charles Hayden (president of the mining company), Hayden was established in 1909 by Hayden, Stove and Company. The present town was incorporated in 1956 and presented with an All-American Cities designation in 1958. Hayden is attempting to reverse the trend toward economic decline caused by the reduction in activity in copper production by diversifying its economic base to include tourism and retirement facilities. Faced with significant reductions in assessed valuation for property tax purposes, Hayden finds itself experiencing major budget challenges. While the town officials and staff understand the importance of technology and have an interest in potential benefits broadband access brings, budget realities preclude acquisition of

advanced technologies and equipment. The police chief believes that a more reliable, faster connectivity could provide on-line training and education opportunities for his officers' as well increasing safety and communications capacity of those officers in the field. The town hall currently has nine computers, no local area network, and only three of the nine computers have internet access. In addition, the library has three computers with internet access. Town government does not have or use GIS, nor does it have a web page. A local ISP provides dial-up access for both the police department and the town hall. Current bandwidth needs – low. Future bandwidth needs – medium.

Miami – This town began as copper mine camp, originally named after Mima Tune, the fiancée of a local miner. It was incorporated in 1918 under the name Miami. Like Globe, Miami has experienced an economic downturn with the reduction in copper mining, smelting, refining and rod manufacturing. It recently eliminated the town manager's position, using a part-time administrator and maintaining a small staff in town hall. There are three computers in town hall and one at the police department, no local area network exists, and only the police department computer has internet access. The town does not use a GIS system and has no plans to do so in the near term. There is no town web page. The police captain indicates that his officers use their own personal cell phones while on duty, mostly as a back-up communications system to the very inadequate radio communication network. The captain indicated numerous incidents over the past year when his officers in the field were endangered by not having direct contact with dispatch and/or other public safety departments in the area. The police department has a dial up connection only and the town has no plans for more bandwidth. Current bandwidth needs – low. Future bandwidth needs – low.

Payson – Payson, gateway to Arizona's Rim Country, is located in the northern portion of Gila County and celebrates its deep agricultural roots which extend back to 1884. It is home to the country's oldest, continuous annual rodeo. Payson is the largest and fastest growing city in Gila County. Incorporated in 1974, it has successfully undertaken an aggressive economic development effort focused on diversification, attraction, expansion and retention. This community has invested in a municipal complex with sophisticated technologies, which include both a local area network as well as a wide area network to connect its multiple sites and facilities. The city currently has a GIS system in place for internal use, but would like to provide for limited public access to the database, as well as to provide for an interactive web site for use by citizens, businesses and development interests. Recently, in an attempt to encourage deployment of high speed internet access for the general community, the City of Payson approved a contract with a fixed wireless internet provider to locate transceivers and repeaters on the municipal water tanks around the area. The city currently has T-1 capacity with a LAN and a WAN for municipal buildings with a 2.4 GHz capacity. Internet connection is via wireless service. Current municipal bandwidth demand is high and anticipated future bandwidth demand will continue to remain high.

Winkelman – Established in 1877, Winkelman, which borders the town of Hayden, has its origins in ranching and farming, deriving its name from a local stockman, Peter Winkelman. The town was incorporated in 1949. Located at the southern end of Gila County, Winkelman's

economy evolved over time from agriculture to predominantly copper mining, smelting and refining. With the reduction in copper mining activity during the decade of the '90's, Winkelman has attempted to broaden its economic base to include more tourism and services for the growing number of retirees relocating there. Internet access is limited to dial-up and service quality is inadequate. There are two computers at town hall with internet access. While there is fiber optic cable running through the community, it is not accessed by Winkelman. Current municipal bandwidth demand is minimal and future demands are anticipated to remain low.

Young – This settlement is located in a beautiful, but remote valley, at the end of a marginally maintained forest service dirt road. It is not an incorporated municipality and limited government services are available. Facilities include a community center, a library and a combined elementary/high school. Midvale Telephone Company provides service to the community, and fiber optic/digital switching capacity exists within the 5,000 acres in Young, but cable television service and cable internet access are not available. Current bandwidth demands for Young are minimal and are anticipated to remain so in the future.

San Carlos Apache Reservation – The San Carlos Apache Reservation was established in 1871 by an Executive Order from President Grant. This reservation spans a geographic territory that is located in three counties – Gila, Graham and Pinal, but the largest population concentration resides within the communities of San Carlos and Peridot. Telephone service is provided by the San Carlos Apache Telephone Utility, Inc. which is laying a fiber optic backbone throughout the reservation.

Tonto Apache Reservation – This very small reservation is well situated on the southern edge of the town of Payson, in the northern part of Gila County. The Tonto Apache reservation was established by an Act of Congress in 1972 and has worked with the US Department of Housing and Urban Development and the Bureau of Indian Affairs to establish modern housing units, paved streets and underground utilities. Major employment is with the tribal administration and with the Mazatzal Casino. Phone service is provided by Qwest.

10.2 Cities/Towns/Communities/Tribal Reservations - Pinal County

Pinal County – Established by the Eighth Territorial Legislature in 1866, Pinal County incorporates an area of 5,371 square miles. Pinal County has a diversified economy and a varied landscape, ranging from desert areas with irrigated agriculture to high mountains and copper mining activity. 25% of the land mass is privately owned. The state of Arizona owns 35% of the land, making it the largest landowner in the county. There are numerous correctional facilities, private, state and federal clustered around the county seat, Florence. Pinal County does maintain a GIS database and an active web presence. While the web page is not currently interactive (other than providing for limited downloading of PDF files), there has been discussion about making some government services available in an interactive format (like some licenses and permits.) The county offices in Florence have an OC3 with one DS3 dedicated to the MIS department and another DS3 for telecom. The third DS3 is classified as a dangler. The

county has multiple county office buildings throughout the service territory with internet access speeds ranging from frame relay, to 56K and ISDN. Current broadband applications and demand is high and future demand is anticipated to remain high.

Apache Junction – Apache Junction is strategically located at the intersection of U.S. highways 60 and 89. Nestled at the base of the scenic Superstition Mountains, Apache Junction borders the rapidly expanding Phoenix metropolitan area. There is DSL available in limited areas of the city and approximately one fourth of the business community has DSL access. The Chamber of Commerce has dial-up access only. The police department is switching mobile providers to attain PCS service as a safety back-up for officers in the field. The chief of police noted strong concern for officer safety in the field due to serious constraints on reliability of antiquated radio communications system. The city is moving towards equipping police cars with laptops and would be very interested in wireless access to state databases in real time. Apache Junction is in the process of designing and constructing a new city hall that will include a new justice center. They will be installing equipment and facilities for video arraignment purposes. The city does not maintain a GIS database at this time. With the impending need for video arraignment, and increased public safety broadband applications, Apache Junction's current and future bandwidth needs are deemed to be high. The city hall currently has ISDN capacity for video conferencing, but long distance charges still preclude frequent use of the system.

Arizona City – While not an incorporated municipality, Arizona City is a rapidly growing retirement and residential area south of Casa Grande. There is current discussion about the potential for incorporation as a municipality, and possible governmental bandwidth needs should be included as a probable strong demand in this community. Current bandwidth demand is moderate to low, but if incorporation moves forward, bandwidth requirements for this area could be expected to move into the high demand category.

Casa Grande – Casa Grande is well situated mid-way between Tucson and the Phoenix metroplex at the intersection of I-10 and I-8. Established in 1879 and named after the Hohokam Indian Ruins in the area, Casa Grande was incorporated in 1915. An area experiencing significant growth, this community has benefited from an increasingly diverse economic base, including agriculture, manufacturing, government, retail, and tourism. The regional medical center is the community's largest employer, with government providing another significant number of jobs. The city maintains a GIS database and an active web site. Neither is currently interactive. There is a desire to add video-conferencing to facilitate interactive meetings without travel. The police department does have laptops in police cruisers with limited wireless access. Police would like to be able to access AZ Department of Public Safety (DPS) database, but state needs to make it TCP/IP protocol. The police department would also like to have real time access to the ACEGIS database. Public safety officials underscore concern for officer safety and limitations on radio communications capacity and interoperability; they cannot currently communicate with DPS. Cell phones are seen as an option, but less desirable. Casa Grande does have video equipped patrol cars, but heat is a major challenge in keeping equipment functioning. The city municipal complex manages a local area network with high speed internet access for approximately 75% of its computers and has a wireless drop from four outlying base radio sites.

The city also maintains a wide area network to 11 sites. City campus includes a justice center with very high demand for video arraignment. The city has four T-1's. There is a need to expand connectivity to local airport. There is a fiber bundle running past the airport, but there was not a local loop expanded into the industrial park for access. Current bandwidth demand is high and anticipated to remain high in the future.

Coolidge – Coolidge was established in 1925 and incorporated in 1945. Named in honor of President Calvin Coolidge, it serves Arizona's cotton industry commercial hub. Besides agriculture, the community's economic base relies on manufacturing, retail, services and tourism. Coolidge supports an airport and just recently celebrated the opening of a modern youth activity center. Businesses in the area vary in technology dependence, but at least one area cotton farmer has a LAN for five computers used to monitor crop productivity and GPS/GSD inputs. An area manufacturer uses three ISDN lines video-conferencing applications. There is fiber running down Attaway Road, but no point-of-access for Coolidge. Coolidge does not currently use a GIS system, although there are plans for it in the future. City does have a web site but it is not interactive. City has satellite internet access. Police department has a fractional T-1 (about half) and the court system has a T-1 for two computers. Other city offices have dial-up access to internet. The new youth center will have a T-1 connection. Current bandwidth demands are high and anticipated to remain high in the future.

Eloy – Established in 1902 when the Southern Pacific Railroad located a switch at the site, Eloy finally incorporated in 1949. Eloy's economic base continues to depend on agriculture and transportation. City has dial-up access to the internet. Court system does use video-arraignment via a T-1, but city cannot use system. The city has a web site which is not interactive. Police department has laptops with modem access in cars. Current bandwidth demand is moderate and given budgetary constraints and other, more pressing funding priorities, is anticipated to remain in the moderate category for the future.

Florence – The county seat of Pinal County, Florence established in 1866 and incorporated in 1906. This historic community has witnessed a shift from an agriculturally-dominated economy to one deeply rooted in government. Florence is a central location for a large state prison complex which makes government the largest employer in this area. Agriculture is still alive and well in the area, with cattle grazing, cotton, grains and grapes being important industries. There is also a growing service sector in Florence. The city maintains a GIS database for internal use. There is a web site, but it is not designed for transactions, although that is a desired application. The Chief of Police has laptops in the police cars which can access a static database but the department would like to see wireless, real time access to state database and local dispatch center via modem instead of using radio system. The city does maintain a local area network but would like connectivity for outlying city facilities. Florence currently has T-1 access. There is no fiber access available in Florence. Current bandwidth demands are high and are expected to increase in the future, keeping it in the high bandwidth demand category.

Kearny – Kearny is a planned community, established in 1958 as a housing community for workers in the nearby Kennecott Copper mine. Mining and refining remain the dominant

economic base for Kearny, but government is also an important source of employment for this area. The town uses satellite for internet access. The town does have a GIS database for internal use only and maintains an informational web site. There are five computers in town hall; all have internet access on the local area network. The off-site police and fire department offices have additional computers with access to the internet but there is no wide area network. Public works also has internet accessed computers but they are not connected back to town hall. Police department does not have laptop equipped patrol cars, but officers do have cell phones which are the preferred communications devices. Radios are limited to line of sight communication and are unreliable. The town does not currently have or use T-1, frame relay or ISDN access. Current broadband demand is moderate and expected to remain at the moderate level in the future.

Mammoth – Mammoth is located in a scenic valley of the San Pedro River and is the one incorporated municipality in the southeastern region of Pinal County. Established in 1887, Mammoth was incorporated in 1960. The economy is dominated by copper mining and smelting but in recent years activity in this economic sector has been impacted by the closure of the copper mine. Mammoth has experienced a net out-migration in population in the last decade and has not been able to attract suitable replacement jobs and economic development. The town does not have a town administrator and relies on a full time town clerk for administration. Town hall has four computers, three of which have satellite internet access and one has dial-up access. The police department has four computers, two with satellite internet access. There is no local or wide area network established, nor is there a town web site. GIS is not an application used by this community. Town hall has nine phone lines, one for dial-up access, two fax lines and the rest for voice. Current broadband demand is low and is not expected to increase in the future.

Oracle – Oracle is not an incorporated municipality but is one of three identifiable communities in southeastern Pinal County (along with Mammoth and San Manuel). It has a volunteer fire department, county offices and a sheriff's station for government services. Wireless service is classified as 'spotty' and cable television service is not available in all locations. Cable modem service is not available. There are three dial-up internet service providers. While officials contacted in this community expressed a strong desire for enhanced service, especially more reliable and higher speed internet access, current broadband demand is low and expected to remain low.

San Manuel – San Manuel is the third anchor of the tri-city area in southeastern Pinal County. Its economy has also been impacted by recent mine closures and reduced productivity in the refining and smelting plants. San Manuel does have a nine-hole golf course and an airport with a paved, 4,300 feet runway. Not an incorporated municipality, there are no city offices. There is a volunteer fire department, sheriff's substation and a satellite health clinic. There is also modest retail activity. The medical clinic has a point-to-point T-1 connection to the main clinic site in Casa Grande. The clinic has limited video conferencing capacity but would like increased speed and reliability. Internet access is limited to dial-up or satellite. Current broadband demand is low and anticipated to remain low in the future.

Superior – Superior is located in an attractive, mountainous setting on State Highway 60, a major east-west transportation corridor. Settled in 1882 as a mining camp, it was incorporated in 1976. Once totally dependent on mining as the only economic sector, the community, which is completely surrounded by public lands, has focused on increasing trade and services in order to attract a more active tourism economic component. Superior is also the location of the Central Arizona Association of Governments' offices. There is also a Pinal County office building which houses a courtroom and branch offices for the clerk, planning and assessor's offices. The town also provides a building for a satellite clinic for Cobre Valley Medical Center. There is a volunteer fire department and the town also oversees the ambulance service. Superior does not have a web site and does not currently use a GIS database. There is one laptop for use by the police department, but it has not yet been put into use. The town hall has five computers, with two enabled for dial-up internet access. The police department also has five computers, with two wired for dial-up internet access. There is no local or wide area network in place. CAAG offices currently have dial-up internet access but need a high speed connection. Once broadband capacity is in place, CAAG has plans to put GIS in use and make it available to member governments. CAAG also needs broadband capacity for engineering applications and expanded software applications. CAAG has 17 computers, two for public access and all have internet access. CAAG does have a server on site and maintains a local area network. Given the existing and potential broadband demands for CAAG, Superior is considered to have a moderate demand which will likely remain in the future.

Ak-Chin Indian Community/Maricopa

Maricopa is a currently unincorporated population center experiencing rapid growth in its housing sector. Recent additions of the Ak-Chin Harrah's Casino, proving grounds for Nissan and Volkswagen and a booming construction trade, has diversified the community's economy beyond the traditional agriculture sector. There is a satellite health clinic for the Sun Life Family Health Center in Maricopa. There is a volunteer fire department and a sheriff's substation. This community has recently undergone incorporation and that will most likely drive broadband demand from a current moderate level into the high demand category. Current demand is driven by existing and planned upscale housing developments.

The Ak Chin Indian Community has a population of less than 800 and a land area of approximately 22,000 acres. The reservation is five miles south of the newly incorporated city of Maricopa in northwestern Pinal County and about 30 miles south of Phoenix, below and approximately 12 miles from the western half of the Gila River Indian Community. The population of the Maricopa area is predicted to grow from 5,000 to 200,000 in the next decade. 2,000 homes have been built there in the past two years and 32 housing developments are in the planning stages for the area. ["Maricopa Becomes a City"; Arizona Republic, 10/16/2003, B1]

The Ak Chin Community economy is based on agriculture, Harrah's Ak Chin Casino, an industrial park, and an array of tribal government services. Twenty tribal service locations are connected by community-owned, single mode fiber with Gigabit Ethernet capabilities and 100Mb to each desktop. The fiber ring has a single T-1 frame relay Internet connection, which is

cached. There are also 3 T-1s for telephone service. Tribal gaming has its own fractional T-1 frame relay Internet connection. The casino has its own Internet connectivity that is managed by Harrah's. The education department has a computer lab and the tribal museum has four public access computers. The fiber network has been cut several times. The community is currently considering a mirror, point-to-point wireless system overlay of the existing fiber network for service redundancy.

The community has a history of aggregate purchase of services. A tribal utility authority currently purchases service from APS that is then distributed to member households and tribal offices as a community service. There is no similar system for purchase and distribution of Internet access. The tribe is developing a ten-year master plan within which Internet access will be considered as a direct education resource for future needs (such as access to vocational education). Also to be considered are: commercial development; ordinance/land uses, and the development of the industrial park, all of which will have a telecommunication component.

Gila River Indian Community – The Gila River Reservation was established by an Act of Congress in 1859. The reservation includes seven community districts, with administrative offices in Sacaton. Economic revenues are derived primarily from several tribally owned casinos, but agriculture also contributes to employment opportunities. Telephone service is provided by the tribally owned Gila River Telephone Company.

Bapchule – Mostly a housing community, Bapchule does have a school. It is not an incorporated community so there are no municipal demands for broadband access.

Sacaton – Sacaton is the site of administrative offices for the Gila River Reservation. There is also a hospital facility and a justice center located within this community. Not an incorporated municipality, Sacaton has no government offices. However, there is strong potential demand for broadband capacity for both the medical facility and the justice center, as well as for the tribal administration offices. Such potential would place Sacaton in the moderate demand category.

10.3 EDUCATIONAL

10.3.1 County

For a number of reasons, schools can serve as the most accurate bellwether for the status of "broadband" network connectivity in Arizona communities. In Pinal and Gila counties, the three most important reasons are:

1) Federal e-rate subsidy support averaging 70% or more dramatically discounts costs for telecommunication services and internet access;

2) Arizona's Students FIRST program which upgraded network technology to provide school LANs and district WANs that aggregate school Internet access to a single broadband connection; and

3) The efforts of the Telecommunications Open Partnerships for Arizona (TOPAZ) program to increase broadband offerings in Arizona communities and reduce average costs of broadband connectivity.

No other market segment has had the price subsidy support and statewide design assistance that County schools have had. In Pinal and Gila County's most rural communities the school is often the only user of higher-bandwidth connectivity, but even in their larger, more urban communities, it may be the first place residents are exposed to advanced network applications and higher bandwidth services.

Typically, network development planning encourages just the sort of district-level aggregation that has already been achieved in Arizona via the Students FIRST initiative. Connectivity to the Students FIRST program's minimum standards (established in May of 2000) was reported completed as of June 30, 2003, so connectivity goals can be said to have been met. [No summary project report or individual county data was available from the Arizona School Facilities Board. A public information request for individual district information identifying district aggregation points (DAPs) was pending as of November 17, 2004.]

The definition of "broadband," however, may still be subject to local limitations. One very rural school reported requesting a T-1 from Qwest only to be told that the last available T-1 had already been leased to the local Circle K store (the school settled for a DSL connection).

Interviews with school district representatives indicate that there are performance issues with current bandwidth investments (typically T-1) as schools begin to sample more advanced applications such as streaming video and online multimedia courseware.

E-rate

In E-rate funding year 2002 (7/1/02-6/30/03), the most recently completed E-rate funding cycle, subsidy commitments for schools and libraries in Pinal and Gila Counties totaled almost $5.1 million dollars. This amounts to almost 12% of the total E-rate commitment for Arizona in program year 2002: $44,520,305.

Pinal County schools received total subsidy commitments of $1,078,935 for Internet access and telecom services. The average discount rate for funded participants was 82%. This translates into e-rate subsidy amounts that support 82% of projected billed costs. Based on this figure, telecom expenses for e-rate eligible schools in Pinal County can be estimated at approximately $1.3 million annually.

Internal connections subsidy commitments totaled $3,238,377. Recipients of internal connection subsidies had discount rates of 80-90%. $2,062,192 of the internal connections funding in program year 2002 went to the Gila River Schools and Library Consortium.

Gila County schools received total subsidy commitments of $296,681 for Internet access and telecom services. The average discount rate for funded participants was 75%. Based on these figures, telecom expenses for e-rate eligible schools and libraries in Gila County can be estimated at $395,000 annually.

Gila County internal connections subsidy commitments totaled $446,681.58. All Gila County recipients of internal connections subsidies had discount rates of 90%. $284,377.51 of the program year 2002 internal connections subsidy funding in Gila County went to the San Carlos Unified School District.

Taken together, telecom and Internet access spending in both Pinal and Gila counties totaled approximately $1.7 million in e-rate program year 2002.

E-rate internal connection subsidies were structurally included in the funding process for the Students FIRST "Deficiency Corrections" technology projects.

Students FIRST

Students FIRST (Fair and Immediate Resources for Students Today) is the popular name of legislation enacted to resolve a court-ordered requirement to develop a constitutional system of school capital finance to address inequities in Arizona's existing school funding system. That system, based on a secondary property tax and limited by the property wealth of a school district, had been declared unconstitutional in 1994 because it failed to conform to the state constitution's "general and uniform" clause. The complete text of the Student FIRST legislation is at http://www.azleg.state.az.us/legtext/43leg/3s/bills/sb1002p.pdf. After a four-year legal and legislative battle, the legislation establishing Students FIRST was signed on July 9, 1988, creating a School Facilities Board (SFB) to administer the program.

Strictly defined as a school capital finance program, Students FIRST is funded by revenues dedicated from the state transaction privilege (sales) tax. Through the School Facilities Board, public school districts in Arizona received funding for the correction of deficiencies in existing school facilities, building renewal, and new school construction, while continuing to have the ability to raise local funds through limited general obligation bonding and capital overrides. The primary goal of Students FIRST is remediation and equity.

One of the purposes of StudentsFIRST was called "Deficiencies Correction," upgrading existing schools to defined minimum standards. The Students FIRST law established a deficiencies correction fund for the purpose of correcting deficiencies in existing school facilities. Deficiencies might take the form of a square footage deficiency or a quality deficiency, and must be corrected by June 30, 2003. The School Facilities Board is charged with adopting rules establishing minimum school facility guidelines, assessing school buildings against these guidelines, and providing monies to bring the buildings up to the guidelines. On November 18, 1999, the Board adopted Building Adequacy Guidelines that now serve as the minimum standards for existing and new school facilities in Arizona.

SFB Technology Initiatives derive also from its task of deficiencies correction. The Students FIRST law also required the School Facilities Board to address technology adequacy in Arizona schools. The SFB adopted a three-part plan to address educational technology. The plan included bringing the computer to student ratio to 1:8 in every district, networking and internet connectivity, and a providing a common, centralized application service provider.

Computers

One of the first steps in SFB's technology initiatives was the purchase, in 2000, of more than 36,000 computers for public school districts at a cost of $44.2 million. These computers were classed at the time of their purchase as multimedia workstations equipped at a minimum with Pentium III 600 MHz Intel processors with Windows 98, NT, or 2000, or Apple 350 processors with OZ9. Each also was equipped with a minimum of 64 Mb of RAM and 20X CD ROM drives and network capability.

In recent interviews, district staff lamented that these machines are currently nearing obsolescence.

Network and Internet Connectivity

In February of 2001 the SFB approved a $100 million networking and internet connectivity project that was intended to substantially improve and support "state-of-the art networking technology to the desktop." The project was to connect all network capable computers in every school to a local area network (LAN). All schools within a district would also be aggregated into a wide area network (WAN) that provides a single district aggregation point for broadband connectivity to the Internet. The Internet and LAN structure is required to be capable of supporting a converged network (voice, video, and data to each networked computer). The district network infrastructures include 100Mb (expandable to one Gigabit) Ethernet connectivity to the classroom and 10/100Mb of connectivity to each networked computer. Installed project

hardware includes switches and routers, cache engines, and content managers. Filtering software and firewalls are also included. The project was originally scheduled to be completed by summer 2002.

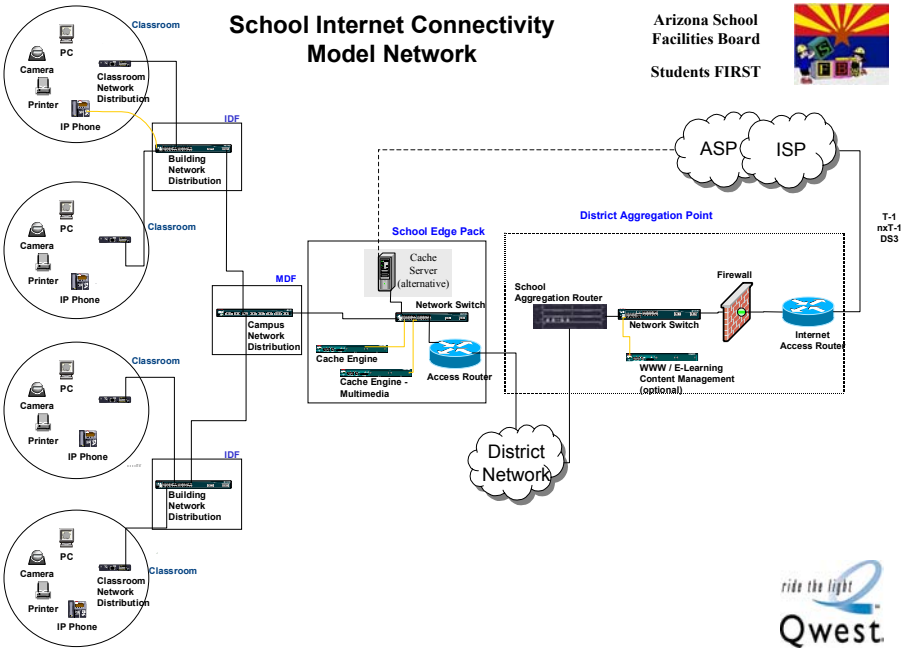
Original SFB Network and Internet Connectivity standards (annotated with an amendment), as published in an SFB FAQ, were:

"…the minimum objectives are to provide the following:

- Internet connectivity to all instructional areas in all public schools
- 100 Mb connectivity to all instructional areas, expandable to 1 Gigabit (expansion may require additional equipment purchases by the district)
- 100 Mb connectivity to each networkable computer both in instructional areas and any other non-instructional areas that have networkable computers; *e.g*., administrative areas
- Filtering software and firewalls for all districts
- Cache engines at all schools having a minimum of 25 networkable computers (revised 12/10/2001)
- Unmanaged 10/100 auto sensing switches at all locations
- All computers in each school on a LAN
- All School LANs in a district aggregated on a District-wide WAN
- Connection to the Internet via the district aggregation point with broadband potential
- Availability of an Application Service Provider (ASP) educational content and productivity software, with updates and support through June 30, 2005
- 3 years of remote network monitoring
- Remote and onsite maintenance
- Technical training and professional development to support the Networking and Internet Connectivity Project

In summary, each District will have, at minimum, networking to each and every networkable computer both in instructional areas, and any other non-instructional areas such as administrative offices, all the switches and routers needed to make it all work, caching and content engines to provide speed and breadth of curriculum material served over the Internet, a content manager, ASP educational content and productivity software, updates and support through 6/30/05, 3 years of remote monitoring and on site service for the network, technical support 24/7, and a firewall and filtering software if needed. " [-- SFB FAQ #66]

A school internet connectivity model network illustration appeared in an SFB "Wiring The State" presentation (5/2/02):
http://www.sfb.state.az.us/sfb/sfbdoc/tech/wiringthestate.ppt



Qwest Internet connectivity specifications from its Design Document (sections 4.1 and 4.4) are paraphrased below:

- *District schools will connect to the Internet via a District Aggregation Point (DAP). Connections may include any of the following, but are not limited to: Private Line Transport (56Kbps, DDS, 1.54Mbps T-1, 45Mbps T3, etc.), Frame Relay, ATM, ISDN, xDSL, VSAT, and wireless. Limited access may require the use of wireless connections in some areas. Wherever multiple options exist, the least expensive/highest bandwidth installation will be offered.*

- *Qwest design and implementation efforts will target a MINIMUM of a T-1 connection to each school even if the District may not be able to afford a T-1 connection at the time of implementation. This requirement was a specification of the SFB to provide a migration capability so that each school will be able to upgrade to a circuit capable of delivering the services that the ASP will provide...*

On May 17, 2002, Qwest informed the SFB that it would not begin work on any new projects. As reported in a June 13, 2003 special audit report by the State of Arizona Office of the Auditor General to the Joint Legislative Audit Committee:

> Qwest stated that finishing the projects it had already started would require it to exceed the original $100 million purchase order. Qwest also informed the Board that current work on the projects would continue until the specific phase of work was completed, but that the next phase would not begin. On may 23, 2002 Qwest informed the board that it would need an additional $80 million to finish wiring all school facilities in Arizona for Internet connectivity. Qwest reports that as of June 11, 2002, 525 facilities had been completely wired, wiring was in process at 329 facilities, and Qwest has yet to begin wiring at approximately 628 facilities.

On August 1, 2002 SFB announced an agreement to modify the original agreement from a $100 million purchase order to a lump sum contract for $140,768,000 (modification of State of AZ P.O. E01SF221; September 20, 2002). Modifications to the original agreement included removal of Qwest's requirement to provide on-site equipment maintenance and other network management and maintenance services. Completed sites already receiving these services were notified that the services would be discountinued effective August 31, 2002.

The new completion date for the modified Statement of Work was June 30, 2003.

Important Note: The Students FIRST technology initiative has been tainted by news of Qwest's SEC fraud indictment related to how early equipment purchases were prematurely booked as completed sales, by the news that Qwest was unable to complete the project at the originally contracted $100 million dollar price, and by questions of the contracting process, allegations of conflict of interest by the SFB's original Executive Director, and other, minor criticisms. However, reaction of interviewed recipients of SFB's technology implementations have tended toward positive comments on the benefits to school districts of the completed upgrades.

Also note that only public school districts were eligible for SFB technology project participation. Charter and other private schools were not. This exclusion was addressed in an answer in the SFB FAQ:

> Charter Schools are established in Arizona pursuant to ARS 15-181(A) which states "Charter schools may be established pursuant to this article to provide a learning environment that will improve pupil achievement. Charter schools provide additional academic choices for parents and pupils. Charter schools may consist of new schools or all or any portion of an existing school. Charter schools are public schools that serve as alternatives to traditional public schools and CHARTER SCHOOLS ARE NOT SUBJECT TO THE REQUIREMENTS OF ARTICLE XI, SECTION 1, CONSTITUTION OF ARIZONA, OR CHAPTER 16 OF THIS ARTICLE." Chapter 16 is the section of ARS that describes Students FIRST. Thus, Charter Schools were specifically omitted from Students FIRST by Statute. [SFB FAQ# 98]

Districts that already have a network that is functionally equal to the SFB model or that has been recently upgraded at district expense and happens to meet the SFB network connectivity requirements will be considered complete and compliant and will not receive additional SFB

funding, or will receive funding only for work necessary to meet all requirements of SFB's standards.

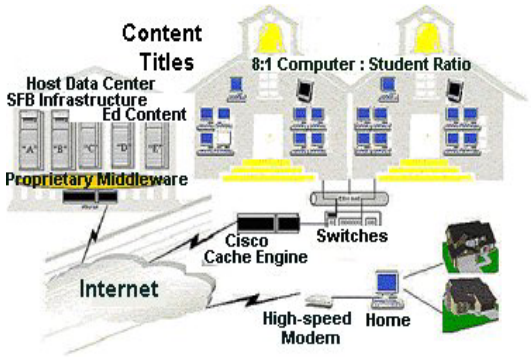
SFB Network Project Spending in Pinal and Gila Counties

No summary data or reports were available from SFB to determine the amount of network investment in Pinal and Gila Counties from the Students FIRST project. However, dividing the $140 million cost of the project by the roughly 800,000 students in Arizona gives a per-capita investment of approximately $175 per student. In Pinal County, with approximately 28,000 students that would translate into an investment of about $4.9 million, or, if estimated by school building (with approximately $100,000 of expenditure budgeted for each of roughly 1300 school buildings in the state) , Pinal County, with 80 school buildings may have seen an investment of about $8 million in Student FIRST network project funding. A similar, though smaller, estimate could be generated for Gila County schools, but beyond such crude estimations, an accurate accounting of investment in each County is likely to remain unavailable.

SFB Application Service Provider component

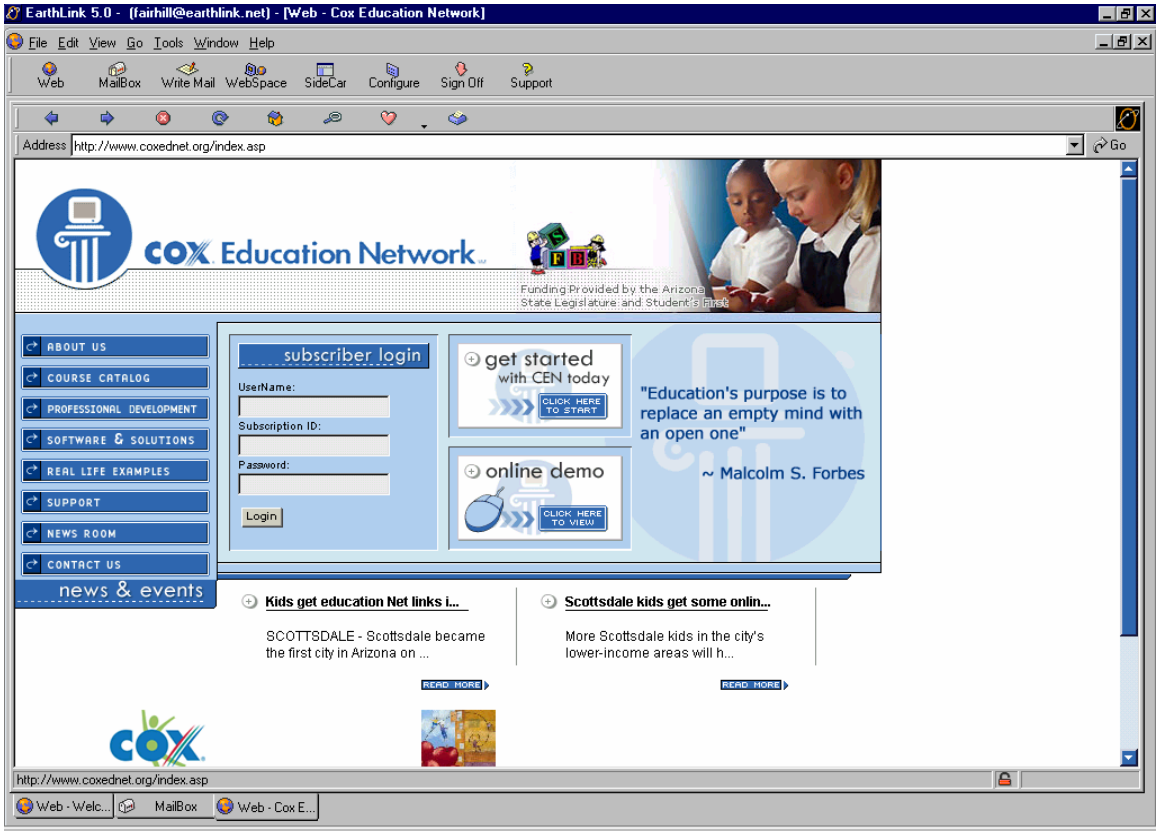
The third element in the SFB technology initiative is providing a common, centralized application service provider (ASP). In August 2001, the board awarded a contract to Cox Business Services, which formed Cox Education Network.

The following is an illustrated outline of the ASP technical structure:



[-- image from SFB FAQ at http://www.sfb.state.az.us/sfb/sfbMain/cont_faq_faqSection.asp?secId=7]

A recent screen capture of the COX Education Network web site:



http://www.coxednet.org/index.asp

An SFB fact sheet describes the Cox Education Network ASP offering:

> "…The network will provide the industry's most expansive collection of educational tools and resources for teachers and students throughout Arizona. The ASP will enable schools to access productivity software, over 250 educational titles, and communications software. These resources will be available over the Internet and can be accessed by students, teachers, and parents from school and from home - anytime, night or day. An additional 7,000 educational titles will be available for purchase by districts at discounted rates. The ASP will host school and teacher websites, e-mail services for staff and students, portfolio storage for student work, and support services to all schools and students. Additionally, the project provides for professional teacher training by ASSET, 20 Cisco Academies, and multiple Microsoft-Authorized Academic Training Programs to

> be placed throughout the state. All schools will have access to the ASP by summer, 2002; service, warranty, and free access to the ASP are included until June 30, 2005.

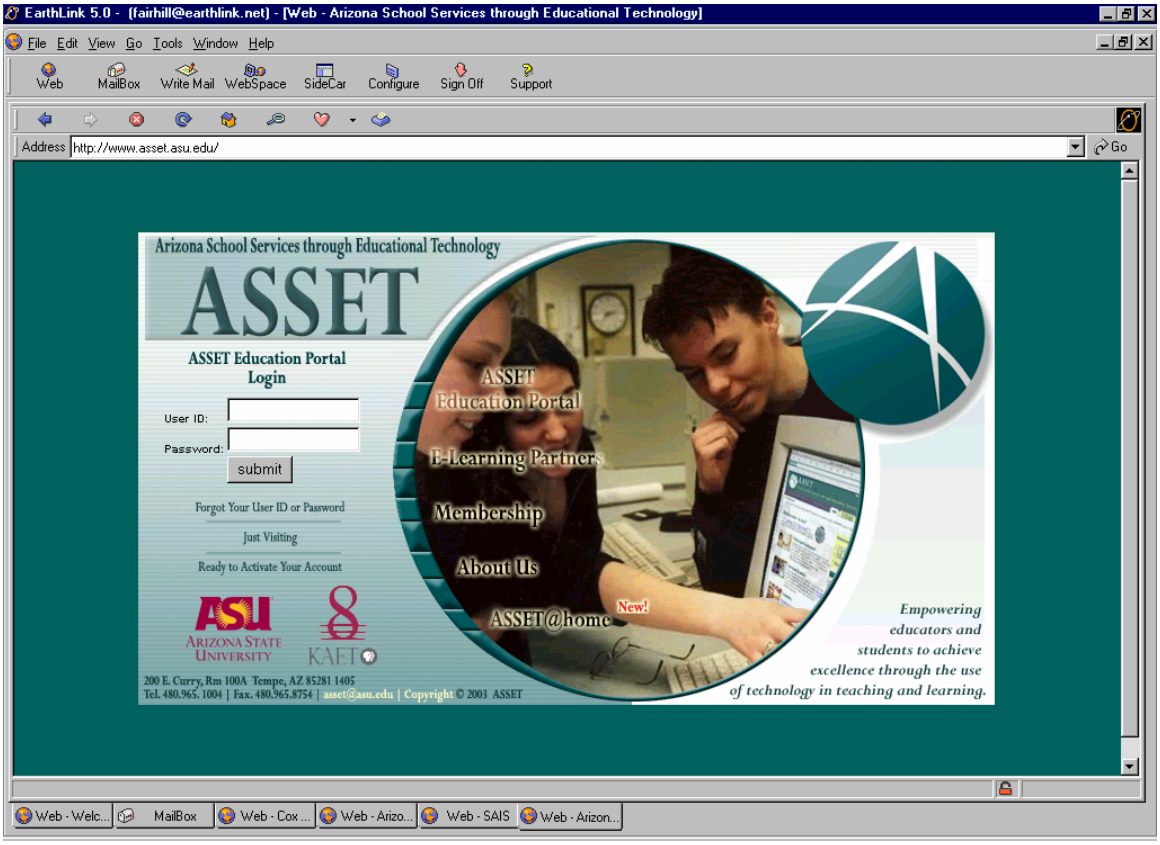
The ASP cost the state roughly $28 million (approximately $8 per student per year, until 2005) School districts are not required to use the Cox Education Network service, and, if they do use it, they would have to pick up its cost on an individual basis after 2005. Cox Education Network is a content service and is not be eligible for e-rate cost subsidy.

In an August 25, 2003, press release, Cox reported that over 700,000 subscribers, including students, teachers, and administrators are logging onto the Cox Education Network (CEN) annually. The press release also identified the "Eloy Public Unified District" as one of the top ten users of Cox Education Network.

Educational site staff interviewed as part of the telecom survey report that multi-media aspects of some Cox Education Network offerings load down their system's Internet linkage due to high-bandwidth requirements. ASSET (**A**rizona **S**chool **S**ervices **T**hrough **E**ducational **T**echnology; described below), a professional development resource that is one element of the ASP offering, includes streaming video media which a few sites report does not function well with their current T-1 connectivity.

ASSET (Arizona School Services Through Educational Technology)
ASSET is a professional development service that is a component of the SFB ASP offering. The ASSET website includes the following description "About ASSET":

> **ASSET Education Portal**
>
> The ASSET Education Portal was launched in May 2002 and was designed to offer educators a wealth of professional development opportunities and curriculum resources.
>
> All of the ASSET resources currently available online are only found through the Portal. Educators will need to register with the ASSET Education Portal to take part in the online registration process for Self-Paced, Classroom Connect's Connected University, and PBS TeacherLine courses. ASSET members also gain personalized access to curriculum resources, such as United Streaming, by registering on the portal website.



http://www.asset.asu.edu/

Advanced, bandwidth-hungry application resources such as ASSET are one reason why Pinal and Gila County Schools may need to look beyond district T-1 connectivity.

Student education and teaching staff support, however, are not the only reasons high-bandwidth connectivity will continue to grow. School district Internet connectivity also supports administrative data reporting that provides more real-time decision-making information for state school finance and policy issues. This is accomplished via a system called the **Student Accountability Information System** or **SAIS**.

SAIS (Student Accountability Information System)

In the Summer, 2002, issue of Spectrum: The Journal of State Government, Hayford Gyampoh, director of MIS and CIO for the **Arizona** Department of Education, described the Student Accountability Information System:

> **Arizona**'s Student Accountability Information System interconnects **Arizona**'s schools and Education Department through the Internet. Electronic collection of student detail and school financial information reduces costs and paperwork and facilitates state and federal reporting. Online analysis supports education decisions.

> School districts, including both traditional schools and charter schools, are connected to the **Arizona** Education Department through the Student Accountability Information System (**SAIS**). Timely school financial information is collected rapidly and accurately and is stored in the department's data warehouse. Electronic data collection is already bringing about reduced costs and paperwork in **Arizona**. Real-time detailed information is now available to be aggregated to satisfy a variety of state and federal reporting requirements, and can be used by educators, legislators and the public for driving policy decisions about education.

This is one area of network use that has deadline driven reporting requirements. One school district business manager interviewed for the survey commented that if the Internet connection for his district (T-1) is slow or interrupted, he has to go home and do the work via his cable Internet connection.

Shared Resources / Infrastructure

Some school districts, such as Coolidge, have wireless connectivity in addition to dedicated T-1s. The wireless connection from Central Arizona College (CAC) to Coolidge allows CAVIT (the Central Arizona Valley Institute of Technology) to offer distance learning classes in Coolidge. Central Arizona College also has the capability to store video of a distance learning class and stream the video to Coolidge.

There are also some examples of infrastructure sharing. For example, the Juvenile Justice Center in Globe gets its Internet connectivity via a fiber optic link to the adjacent County Government Building, where it links to the Internet via the District Library T-1 to the University of Arizona. Florence High School shares its Internet Access with the Florence Community Library, which is on its campus and also serves as the school library. Florence High School gets its wireless connectivity to CAVIT at Central Arizona College via a wireless link to the Coolidge school district CAC link.

The wireless link from Florence to Coolidge is necessary for Florence High School to access CAC wireless services because the County landfill hill blocks the line-of-sight to CAC from Florence. These wireless connections are used solely for distance learning video and do not provide any additional Internet connectivity advantages to either school.

Other Network Initiatives

National Native American Network (http://www.oiepmis.bia.edu/) – Two Gila River Community reservation schools in Pinal County, Blackwater Community School (Coolidge) and Casa Blanca Community School (Bapchule) are participant sites on the Educational Native American Network (ENAN), a joint effort between the Bureau of Indian Affairs and the Office of Indian Education Programs.

CyberSchool Movement - Three traditional school districts won approval this year to start offering CyberSchool services using the Internet: Peoria, Tempe Union, and Tucson. There are

also openings for two more district-run schools to participate in an Arizona pilot program to see how well cyberschools teach children. Peoria and Tucson reportedly plan to begin enrolling students in cybercourses this year. Tempe Union will be taking this school year to plan a virtual high school that is slated to open next year. These three school districts, new to cyberschooling, join Deer Valley and Mesa, districts that have been operating cyberschools for four years. There are also seven charter cyberschools operating in the state.

None of the school districts in either Pinal or Gila counties provide cyberschool programs. However, the Gila County Education Service agency has recently proposed extending access of its licensed Plato learning system resources (used in the Juvenile Jail adjacent to the County Office Building) to users anywhere in the county, via a program called the Gila Distance Learning Network (GDLN). The program could increase graduation rates in the county and help pregnant teens and other students whose school completion has been disrupted for any reason. For more information about the proposed GDLN, contact Mark Wilkerson, Director of Gila County Detention Education Programs, 928-435-3231, ext. 8604.

Findings

The following observations are based on information collected in a variety of ways, including personal interviews, phone interviews, faxed survey forms, e-mail queries, and examination of the public record of e-rate application/commitments and as-built records at the Arizona Schools Facility Board.

The quality and detail of the responses gathered varied with the job title of the person responding. School Technology Coordinators/Directors could provide technical and usage details that Principals, Superintendents, and Business Managers typically might not. Administrators could provide operational and cost concern commentary that Technology Coordinators might not. And some comments were gathered regarding the performance of network connections, although classroom teachers, those who would have to find and incorporate online materials and applications into their curricula, were not interviewed. Therefore, a true assessment of classroom and curriculum integration performance of the network connections of surveyed schools is outside the scope of this report.

Connectivity and Issues

School districts in both Pinal and Gila counties show a near ubiquity of T-1 connectivity.
The Students FIRST networking project has implemented a centralized network connectivity point in each district, called a District Aggregation Point or DAP (details regarding DAP design for each school district have been requested via a public information request from the Arizona Schools Facilities Board, but have not been received as of the preparation of this report). The predominant technology is frame relay, although ATM is reported available in the Apache Junction and may be in use at the Apache Junction Unified School District. In both counties more than a third of districts report an interest in upgrading their connectivity beyond their current levels within the next 12 to 18 months, in interviews citing slow performance as an issue. Approximately 90% of public school districts in each county apply for and receive e-rate subsidy for data circuits and Internet connectivity.

County	Upgrade in 12-18 months	E-rate Recipients
Pinal	39%	92%
Gila	37%	87%

Sixteen percent of districts in each county would like to more than double their Internet connectivity in the next 12 - 18 months. The interval of 12 - 18 months was a feature of the survey and not an interval volunteered by respondents. However, the combination of school district budgetary cycles and the e-rate request/planning cycle would almost certainly result in a 12 - 18 month interval for such an upgrade unless the district had sufficient funding to go ahead with such a purchase.

[Note: each county contains a vocational district that was not counted in these percentages. CAVIT in Pinal County receives its connectivity via Central Arizona College, where its office is, and has not considered e-rate application. In Gila County, CVIT - Cobre Valley Institute of Technology, headquartered in Globe, did not respond to the survey and follow-up calls. In Northern Pinal County Apache Junction Unified School District is a member of the EVIT - East Valley Institute of Technology district. Headquartered at the Tempe Union High School district, EVIT is a public regional vocational high school that serves students from ten East Valley School districts.]

Other network technology issues of concern to school districts include:

- Network performance / understanding connectivity
- Reliability
- Redundancy
- Maintenance
- Technical assistance
- Training
- Use of data
- Operational assistance (TCO, lifecycle planning, optimization of e-rate support)

The following tables display current bandwidth and anticipated bandwidth for public school districts and other school respondents in each county. Brackets around a name indicate a school or district that either did not apply for e-rate in program year 2002 (completed in June 2003; the most recent complete year) or did not qualify for data circuit and Internet connectivity funds. No entry in the "needed in 12-18 months" column indicates no increase, an entry of "don't know" on the survey form, or no entry on that portion of the survey. Also, note that some network connectivity information was gathered from the public record or otherwise indirectly and thus does not reflect an active, informed response from a school district.

Pinal County

DISTRICT	BANDWIDTH	NEED IN 12-18 MOS.
Apache Junction	T-1	
Casa Grande Elem.	768K	T-1
[Casa Grande Union HS] e-rate for telephony only	T-1	10 Mbps
CAVIT (Central Arizona Valley Institute of Technology)	at CAC*	
Coolidge Unified	T-1	
Eloy Elem.	T-1	2 T-1
Florence Unified	T-1	10 Mbs
J.O. Combs Elem	T-1	
Mammoth-San Manuel	T-1	
Maricopa	T-1	10 Mbps
Oracle Elem.	T-1	
Pacheco Elem.	T-1	
Ray Unified (Kearney)	2 T-1	3 T-1
[Red Rock Elem.]	56K	
Sacaton Elem.	T-1	
Santa Cruz Valley Union HS	T-1	
Stanfield	T-1	
Superior	2 T-1	4 T-1
Toltec	T-1	

OTHER SCHOOLS

Casa Blanca Community School	T-1

CAVIT (Central Arizona Valley Institute of Technology) is the 19th Pinal school district. It shares network access of Central Arizona College.

Gila County

DISTRICT	BANDWIDTH	NEED IN 12-18 MOS.
Globe	T-1	2 T-1s
Hayden-Winkelman	DNR*	
Miami	T-1	
Payson	3T-1	T3 (45Mbs)
Pine/Strawberry	T-1	
San Carlos	T-1	
Tonto Basin (Satellite)	512Kbps	T-1
[Young] (Satellite)	512Kbps	
St. Charles School (San Carlos)	DSL	

* DNR = Did Not Respond

Issues

Network Performance / Understanding Connectivity

Some districts in the survey reported performance problems with their Internet connection, others did not. It is important to understand that two T-1 frame relay Internet connections, each from a different vendor; will not perform identically due to a number of variables.

The first variable is the kinds of applications and the number of uses that a district may have for the network connection. If a district is only doing common browsing and e-mailing, with little or no file uploading or downloading, there may be no awareness of performance problems. If the users in a district are doing web-based educational applications or attempting such things as video streaming, problems with network connectivity performance can be more noticeable. Interviewees and survey respondents noted that their use of COX education network is limited due to slow performance. In particular, one Gila County district, with a 512k satellite connection identified two applications it would like to use in a classroom setting (Typing Pal and AIMES) but cannot due to slow performance. Another district mentioned problems with trying to use streaming media features of COX/ASSET over its T-1. There should be some means for districts statewide to share application/performance problems and best practices for access to these resources. Otherwise, some level of wasted investment in state shared resource access will continue.

A second variable is the routing offered by a district's ISP. A satellite service provider will have latency issues due to its additional 42,000 mile path, but added to that may be issues of how they route on the ground as well. States with centralized networks and uniform addressing can provide greater control of network traffic. Arizona's multiple-vendor service model may introduce latency and long-path routing performance problems for some participants. What is needed is a set of benchmark application tests that all districts can apply to assess point-to-point in-state communication and specific resource linking performance of their vendor. Districts may

need to be educated about how addressing and vendor technology may be affecting their network performance.

A third variable is network monitoring. Even the most performance-optimized network connection will vary in responsiveness in different parts of the day and seasonally with differences in network traffic loading. Districts should try to effectively map the performance parameters of their connection and plan usage of the network or enhancement of the network resource accordingly.

A fourth variable is internal control. Higher education institutions have in recent years experienced massive growth of network resource demand due to file downloading and file sharing applications, among other high-bandwidth uses. As a result, they have begun instituting hardware and software controls that limit certain types of usage on their networks. It may be early for school districts to begin such a consideration, but certainly the higher education community can be looked-to as a model for resolving this issue.
Note: According to the Qwest Technical Requirements Document cache engines were to be installed at all schools with more than 25 PCs. This may have optimized performance of the typical T-1 frame relay connectivity of most districts, but a solution for performance above a single T-1 connection appears to be needed. Additional T-1 lines may bring engineering problems with load balancing or filtering setups that smaller districts will be technically unequipped to handle.

Reliability
The most important performance feature of network connectivity is the ability to deliver a resource to the classroom in the context of the curriculum and daily schedule. Some schools in Pinal and Gila counties experienced network outages of hours, days, and -- in one case -- of two weeks. Without reliable availability, teachers can not afford to build network-accessible resources into their lesson plans. It is important to track and document network outages on both a district and county level so that the issue can be addressed on a higher level with telecommunications infrastructure vendors and within the process of any new infrastructure planning that may take place in a county.

Redundancy
Redundancy is the missing element in most of the reliability problems noted above. In many communities there is only one provider of network connectivity or the multiple providers are re-selling the incumbent telco's infrastructure, so that it is a single connection which may fail. In more developed areas, multiple vendors or multiple connectivity methods (both fiber optic and wireless, for example) can provide some measure of redundancy for organizations that can afford multiple connections or redundant technology investment. This also requires the technical capability to build and maintain a fail-over system that can automatically switch their connection when one provider goes down. A statewide effort could design and recommend a cost-effective, "best practice" methodology for smaller districts for this purpose.

Maintenance

As ubiquitous network access grows and network application use increases, so do costs to maintain these systems, becoming yet another fiscal burden to school districts. One district commented, "One of the most difficult problems to deal with is the cost of the servicing our technology equipment along with network problems. We have already spent $11,000 to this point [November] in the school year." A lack of attention and investment in maintenance leads to reliability problems, as described above, and leads to problems for classroom teachers, who often have to do a certain amount of technical support or maintenance as part of their use of technology in the classroom, taking away from valuable instructional time.

Technical Assistance

Technical staffing is typically lean among school districts and staff appear to be somewhat overwhelmed by maintenance issues (described above). This affects infrastructure development because development often adds complexity or at least additional work into an already saturated work environment. Also, in rural areas, outside technical assistance from vendors and staff at related or nearby institutions is limited or absent. Small or single person tech staffs also have more difficulty in getting away to training programs or conferences where they may learn how to resolve their technology issues.

Training

The maintenance and technical assistance issues listed above also leave little time for technical staffs to train and support classroom teachers in incorporating network resources in their teaching. This is a Catch-22 of the system, because increasing the use of network resources in the classroom setting will also increase maintenance and technical assistance pressures on a district. Also, it is not only teaching staff that needs training and support. Training support for the increasing use of network technology by administration is also a factor.

Use of Data

Another issue for districts is the problem of how to use the management and student data that new financial administration and student tracking systems are generating. The shift of strict paper reporting methodology to strict online reporting methodologies has placed additional pressures on the technology environment within a school district.

Operational Assistance

Although infrastructure development is an issue that will affect all school districts, internal issues of sustainability of technology resources and decision-making regarding budgetary commitments are an increasing area of concern for district administrators. Concepts such as "Total Cost of Ownership" (TCO), long familiar in the cost-management processes in the business world, are new to schools. Desktop PCs have relatively short life cycles and need to be replaced on a regular schedule. The ongoing cyclic application renewal process for e-rate support needs to be smoothed and optimized. Although the problem of operational assistance is more than an agenda item for periodic superintendent's meetings, it may require a more structured approach on a county-wide or statewide basis. It is not until some level of comfort is achieved with operational problems that districts will be able to confidently participate in infrastructure upgrades and

potential resource sharing arrangements. Otherwise, districts may become increasingly disinclined to add new complications to an already overwhelming issue.

Summary

Over all, schools in both counties are unusually well aggregated for connectivity on the district level but only adequately connected to the Internet from their district aggregation points. The next step will be to develop affordable strategies for multi-megabit access for district sites.

E-rate eligibility may limit school district ability to participate in aggregated infrastructure projects unless the projects pay particular attention to the strict requirements of the federal subsidy program and structure their business processes to fit them. Also, changes in the E-rate program and uncertainties about its future may cause school districts to be cautious in committing to increased investment in network access technology.

10.3.2 Higher Education

In common with other states, Arizona's Internet infrastructure has its origins in higher education research projects and early experiments in extending network access to off-campus and rural sites in the state. These very early efforts grew into a network project named The Arizona State Public Information Network (ASPIN). The following paragraphs (from three sources) briefly describe the origins and purpose of ASPIN:

> …Since its 1987 inception, the Arizona State Public Information Network (ASPIN) coalition has been pivotal in the establishment of state networking resources. ASPIN garnered funding and established Arizona's first connections to what has become the Internet. The ASPIN coalition extended this connectivity from the Universities, to the rural community colleges, and on to County, while building partnerships between University researchers, and the Arizona community. Currently, ASPIN maintains a close relationship with County schools, state and local government, the legislature, the business community, and Arizona's universities to facilitate the development of mutually beneficial collaborations. By utilizing these strong relationships established under ASPIN, a diverse community of interests unites and combines resources with the County education community to initiate and implement field-based, community-driven projects.
> *[-- from "About Us" at the still extant ASPIN website:*
> *http://aspin.asu.edu/about; the page includes a link to a 17 minute RealVideo clip about ASPIN.]*

> …ASPIN, led by Arizona State University in collaboration with the University of Arizona and Northern Arizona University, provided the first successful linkage and interconnecting of multiple universities, community colleges, agencies of city, county, and state government, plus several high tech industrial sites in Arizona (*i.e.*, Motorola,

> Intel, etc.). Completed in 1991, phase one of ASPIN resulted in a computer network interconnecting the cities of Flagstaff, Phoenix, and Tucson. http://aspin.asu.edu/vbns/ASUNet/Content/tasunt.html
>
> …Arizona State Public Information Network (ASPIN), based at ASU, assists Arizona's public organizations and communities in connecting to the Internet. Phase I connected the three primary urban areas of Flagstaff, Phoenix, and Tucson with a state-wide backbone and within these urban areas they have provided connections to many organizations (over 50 in Phoenix). Phase II, aided by NSF funding, extended the backbone out to the state's eight rural community colleges and from there into their communities. Phase III is a proposed plan to connect Arizona's County schools to the backbone developing a robust educational network. ASPIN also staffs and supports three state-wide Network Information Centers (NICs) providing a one-stop ready reference point and help desk for Internet users. http://www.researchedge.com/uss/note.html

A fall, 1997 diagram shows connectivity detail for sites linking to the Internet via ASU: http://aspin.asu.edu/vbns/ASUNet/Content/dstate.html. Of Pinal and Gila Counties only Apache Junction Unified High School, Apache Junction City/Public Library, a Maricopa Agricultural Research site, and the City of Casa Grande are listed. University Internet access provision in the state was segmented by campus geographic region: NAU provided services in Northern Arizona, ASU in central and south-central Arizona, and University of Arizona in Tucson provided service in south-east Arizona.

The rise and boom of the Internet in the mid-1990's and the commercialization of Internet service provision, plus state rules that limit competition with commercial businesses, caused the ASPIN statewide network concept to change to a more conservative provision of services. All three campuses now provide Internet access only to university-research linked sites (typically via grant funded research programs generated by the various university departments), program operational sites such as state Cooperative Education offices and a remote weather sensing network, and a handful of other sites that continue their ASPIN-era connectivity relationships.

According to a representative of ASU's Data Communication Operations department, ASU Internet service provision has dwindled from approximately 90 off-campus sites three years ago to just 16 as of summer, 2003.

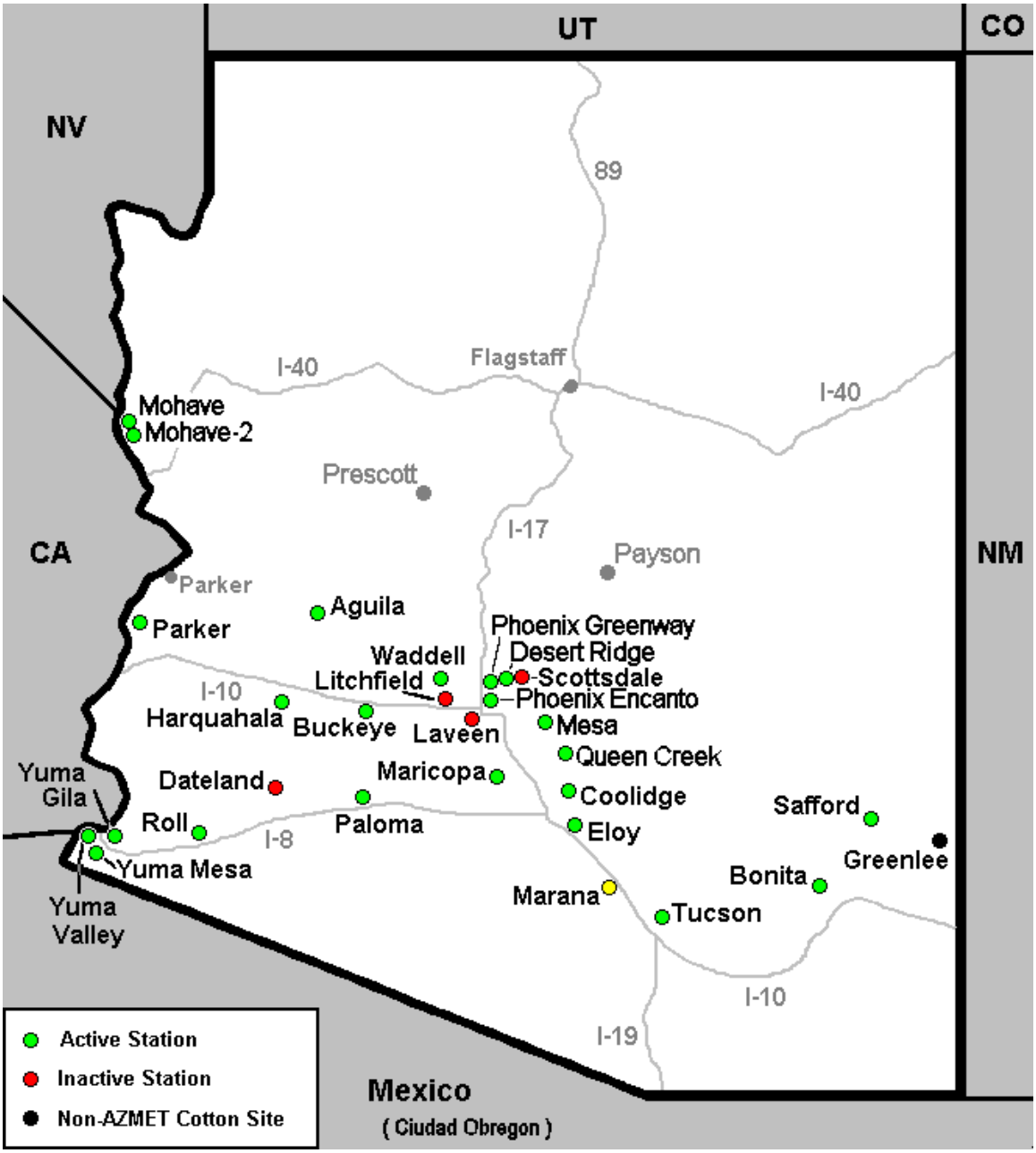
ASU now provides internet connectivity only to the City/Library of Apache Junction. The University of Arizona provides Internet access to the Gila County Library District (and through them, the Juvenile Justice Center), and Miami School District, as well as to the following Agriculture Network sites:

CALSNET, **College of Agriculture and Life Sciences Network**, University of Arizona

Pinal and Gila County connections:

Unit	Location	Link Method	Local Contacts
Boyce Thompson Arboretum	Superior	56K Frame Relay	Qwest
Maricopa Ag Center	Maricopa	Fractional T-1 - 768k, 10 voice	
Pinal County Cooperative Education Office [Casa Grande]	820 E. Cottonwood Lane, Casa Grande	T-1 County Connection	County
Gila County Cooperative Education Office [Globe]	Globe, 928-425-7179	11Mbps/ County Connection	County
Gila County Cooperative Education Office [San Carlos]	San Carlos, 928-475-2350	CALS 800#	
Gila County Cooperative Education Office [Payson]	Payson, 928-474-4160	384k Wireless/ County Connection	

AZMET: The Arizona Meteorological Network



AZMET is a service of the University of Arizona Cooperative Extension program. The following information about AZMET is from a description on the AZMET Website (http://ag.arizona.edu/azmet/):

> The Arizona Meteorological Network (AZMET) provides meteorological data and weather-based information to agricultural and horticultural interests operating in southern

and central Arizona. Meteorological data is collected from a network of automated weather stations located in both rural and urban production settings. Meteorological data collected by AZMET include temperature (air and soil), humidity, solar radiation, wind (speed and direction), and precipitation. AZMET also provides a variety of computed variables, including heat units (degree-days), chill hours, and reference crop evapotranspiration (ETo). AZMET data are summarized in a variety of formats, including several ready-to-use summaries that use English units, and comma-delimited ASCII text files that can be imported into most database and spreadsheet programs. Special reports generated by AZMET include the Phoenix Area Turf Water Use Report and Weekly Cotton Advisories (generated Mondays from February through August). AZMET began operating on Jan 1 1987.

The University of Arizona also provides Internet connectivity to Gila Community College through its T-1 connection to Pima Community College.

Northern Arizona University (NAU; Flagstaff) offers a limited number of upper division courses via cross-connect with Central Arizona College. NAU has shared microwave tower facilities with Central Arizona College since August of 1995.

Community Colleges

Central Arizona College (Coolidge)
http://www.cac.cc.az.us/

Central Arizona College (CAC) is a multi-campus two-year community college, one of ten districts that make up the Arizona Community College system. CAC is comprised of three main campuses and two satellite facilities. The Main campuses are Signal Peak (near Coolidge), Aravaipa (Winkelman), and Superstition Mountain (Apache Junction). The two satellite campuses are: Casa Grande and Arizona State Prison (Florence),

Central Arizona Community College began offering classes in 1969. In 1992 the college received a five-year Title III grant, which included funding of $217,000 to $240,000 each year to construct an analog telecommunications hub for teaching throughout the county. This allowed the college to construct its first distance learning system. CAC began offering distance learning courses in May, 1994 at its Aravaipa Campus in Winkelman and in the fall of 1995 at its Superstition Mountain Campus in Apache Junction.

CAC now offers more than 78 regularly scheduled instructional hours per week, serving a student population of more than 12,500 students. In addition, the distance learning system is used for meetings, special seminars, student-teacher conferences, and other events.

The current CAC distance learning system uses licensed microwave technology over long distances (crossing the LATA into Apache Junction, for example). Its hub is on the Signal Peak Campus (Coolidge) with links to the Superstition Mountain and Aravaipa Campuses. Northern

Arizona University (Flagstaff), which has shared tower facilities with Central Arizona College since August of 1995, began offering a limited number of upper division courses via cross-connect with Central Arizona College.

In 2001 Central Arizona College received a $130,000 Rural Utilities Service distance learning grant to improve existing facilities and convert those facilities from analog to digital transmission. The purpose of the grant was described on the RUS website:

> Central Arizona College intends to use RUS grant funds for a distance learning project to purchase the equipment necessary to convert signals to a digital format. Digital equipment will allow the college to continue offering classes via interactive video, audio, and computer to campuses of Central Arizona College at the Signal Peak, Aravaipa, and Superstition Mountain campuses. Additionally, a connection is planned for Apache Junction High School (with connections through them to rural schools in Gold Canyon). The goals of the project are to purchase and install digital encoding/decoding (CODEC) equipment to replace existing analog devices, purchase and install equipment to interface with common carrier digital transmission equipment, continue providing distance learning services at current remote campus locations, and expand distance learning operations to offer service to additional rural communities. The proposed system will convert the current antiquated analog system to digital transmission, improve reliability and quality, and add another site. A CODEC will be installed at each site for digital to analog/analog to digital conversion. Echo cancellation and feedback control will be installed and microphones upgraded. Lighting will be improved for teacher workstations. Interfaces will be installed to ensure a clean connection to the common carrier provider. The system will also include routers, servers, hubs, and Internet streaming equipment.

The RUS grant project was completed in the summer of 2003. All transmissions now use digital IP formatting. Initial testing indicates that radio upgrades have provided more bandwidth than originally expected.

CAC is also the distance education service provider for the **Central Arizona Valley Institute of Technology (CAVIT).** CAVIT is a public school district working in partnership with five area high schools: Casa Grande Union High School, Coolidge High School, Florence High School, Maricopa High School, and Santa Cruz Valley Union High School, providing vocational training.

CAC currently has a proposal under consideration by the USDA RUS Distance Learning grant program to add Santa Cruz Valley High School (Eloy), Stanfield School District, Maricopa High School, Ray High School (Kearny), San Manuel High School, and Superior High School to its service network as sites for CAC/CAVIT/NAU offerings.

County project sites will use T-1's to connect to CAC via the Internet. CAC hub will connect to its Aravaipa Campus and Superstition Mountain Campus via licensed microwave at 12 Mbs. The CAC hub will connect to the Internet via licensed Microwave at 4.5 Mbs. The system is designed

to provide more-than-adequate room for growth of services and applications. Both licenses are for 6 GHz point-to-point. There is also an 11 Mbps unlicensed (spread-spectrum) wireless link to CAC's State Prison facility in Florence and to Florence High School (for CAVIT).

Gila Community College

http://www.gilaccc.org/

Gila Community College (GCC), with campuses in Globe, Payson, Hayden/Winkelman, and San Carlos, recently underwent a change of status to a provisional community college district (defined in state statute at http://www.azleg.state.az.us/ars/15/01409.htm). GCC provides courses through a service relationship with Pima Community College.

GCC's relationship with PIMA CC as described on the website in answer to the question "Who gives credit for the courses completed?"

> The Gila County Community College Provisional District has entered into a contractual agreement with the Pima County Community College District, located in Tucson, Arizona. This agreement allows students taking courses at any Gila County location to receive credit and services provided by Pima Community College.
>
> Pima Community College has over 50,000 students and is the nation's sixth largest community college district. It has six Tucson campuses, two learning centers, conducts courses in Santa Cruz County, and is contracted for courses and services by the new, but not as yet accredited, Tohono O'odam Community College in Sells, Arizona. Pima Community College is accredited, like other Arizona colleges and universities, by the North Central Association. The College has an approved course list of over 5000 offerings.
>
> Pima Community College has a web site at http://www.pima.edu

GCC had previously provided courses through a service relationship with Central Arizona Community College.

Distance education is currently provided from Pima CC via cable television in Payson (channel 62) and Globe (channel 21). There are IP video capable T-1 links between the Payson Campus and the Globe campus, and between the San Carlos campus and the Globe Campus. The Globe Campus is linked to Pima Community College via a T-1.

Internet connectivity is provided by the link to Pima CC, via Pima's Internet link to the University of Arizona (4.5Mbs). The GCC library receives catalog services through the Gila County Library District.

10.4 LIBRARIES

Public library districts in both Pinal and Gila counties aggregate their connectivity to the Internet and operate centralized catalog systems that depend on sufficient bandwidth and reliable Internet connectivity for everyday operations. In a Gila County interview, a librarian, after describing how patrons turn and walkout when they hear that the Internet connection is down, noted: "Internet access is an essential tool to our provision of service. We wouldn't be in business, now, without it."

In most communities, libraries may be the only public site that provides free Internet access. In practice, there is a strong demand for access to Internet-linked PCs in public libraries. Students, who have very structured access to the Internet at their schools, can visit the library after school for additional, unstructured network access. Others use the terminals for e-mail, serious research, or just browsing topics of Interest. Libraries operate formal registration processes to control access to these network-linked computers, with limitations in time and formal user agreements that attempt to control abuse of these privileges.

The downside of public access Internet at public libraries in Pinal and Gila Counties is that when the public access terminals are in use, staff uses of administrative functions, such as catalog maintenance, slows or even becomes impossible due to bandwidth limitations of the library connection.

Both county library districts recognize this and are upgrading their library connections to T-1 whenever it is both possible and affordable, or moving to cable internet connectivity or other forms of less than T-1 high speed access, where these are available.

Pinal County Libraries

The Pinal County Library District (http://co.pinal.az.us/library/) aggregates its library connections to its Innovative Interfaces, Inc., catalog system hosted at the Pinal County MIS department where it also shares Internet access (T-1 frame relay PVC). Pinal County Library District affiliate libraries include: Apache Junction Public Library, Arizona City Community Library, Casa Grande Public Library, Coolidge Public Library, Eloy Public Library, Florence Community Library, the Arthur E. Pomeroy Library (Kearny), Mammoth Public Library, Maricopa Community Library, Oracle Public Library, San Manuel Public Library, and the Superior Public Library.

Library network connectivity is currently (9/03) achieved through a mix of T-1 or 56K point-to-point circuits. The Library District plans to upgrade all 56K sites to T-1 point-to-point by November of 2004. Library sites, type of service, costs and scheduled upgrades are shown on the following table:

Service Provider: Qwest				
SITE	TYPE OF SERVICE	MONTHLY COST	ANNUAL COST	PLAN T-1 UPGRADE
Pinal County Library to MIS (District Office)	T-1/Point to Point	$142.40	$1,708.80	
Florence Community Library	T-1/Point to Point	$142.40	$1,708.80	
PVC (permanent virtual circuit) for all libraries	T-1/Frame Relay	$ 61.28	$ 735.36	
Arizona City Community Library	T-1 Point to Point	$502.12	$6,025.44	
Eloy Public Library	T-1 Point to Point	$444.42	$5,333.04	
Maricopa Community Library	56K Frame Relay	$122.12	$1,465.44	by 11/04
Superior Public Library	T-1 Point to Point	$236.52	$2,838.24	
Mammoth Public Library	56K Point to Point	$146.03	$1,752.36	by 11/04
Oracle Public Library	56K Point to Point	$152.67	$1,832.04	by 11/03
San Manuel Public Library	56K Point to Point	$146.03	$1,752.36	by 11/04
Arthur E. Pomeroy Library (Kearny)	56K Point to Point	$133.36	$1,600.32	by 11/03
TOTAL		$2,229.35	**$ 26,752.20**	

Two Pinal County libraries, Casa Grande Public Library (http://www.ci.casa-grande.az.us/library/library.php), and Apache Junction Public Library (http://www.ajpl.org/), operate their own catalog systems and have separate Internet access arrangements. Casa Grande Public Library has a T-1 Internet connection from the ISP Cybertrails. The Apache Junction Public Library shares a 2Mb ATM Internet connection to Arizona State University. Casa Grande Public library has no online access to its library catalog. Apache Junction public library has an online catalog and a number of other patron services online, including Tutor.com, homework help that is accessible from the library or at home to any Apache Junction student/patron with a valid library card (the bar code number serves as a password).

The Apache Junction Public Library is also an EDIC (Economic Development Information Center), part of a statewide program serving the business development resource needs of the community. The library maintains a core collection on economic development that includes basic information on business, economic development in Arizona, demographics, marketing, finances, and "how to" materials aimed at small business. Casa Grande Public Library and Florence Community Library are also EDICs in Pinal County.

Pinal County Libraries received a total of $23, 840 in E-rate telecom services subsidy for the most recently completed E-rate funding cycle, year 2002 (7/1/2002 to 6/30/2003) at a consortium discount rate of 77%.

There are five other libraries in the county, the Ira H. Hayes Memorial Library (Sacaton) in the Gila River Indian Community and the four library collections served by Central Arizona College (http://www.cac.cc.az.us/library/) from a common catalog at its Signal Peak Campus in Coolidge: CAC Signal Peak Campus, CAC Aravaipa Campus, CAC Superstition Campus, and

Casa Grande Union High School. The Ira H. Hayes Memorial Library receives network connectivity as part of the Gila River Schools and Library Consortium. Casa Grande Union High School also has library database resources and catalog access online from its own website (http://www.cguhs.org/CGHS/WebShare/Library/Bills/index.htm).

Gila County Libraries

The Pinal County Library District (http://co.pinal.az.us/library/) aggregates its library connections to its catalog system hosted at the Gila County MIS department. Gila County Library District has a T-1 Frame Relay connection to the University of Arizona for Internet Access. Gila County Library District affiliate libraries include: Globe Public Library, Hayden Public Library, Isabel Hunt Memorial Library (Pine), Miami Memorial Library, Payson Public Library, San Carlos Public Library, Tonto Basin Public Library, Young Public Library. Gila County Library District also provides library catalog services to the Gila County Community College campus in Globe.

Library network connectivity is achieved through a mix of dedicated fiber optic connections (to the adjacent Juvenile Justice Center), cable Internet (Globe and Miami), T-1 or 56K point-to-point or frame relay circuits. As in Pinal County, a district goal is to upgrade all sites to T-1 whenever cost and availability make it possible.

Globe Public Library is the EDIC (Economic Development Information Center) for Gila County.

Gila County Libraries received a total of $33, 626 in E-rate telecom services subsidy for the most recently completed E-rate funding cycle, year 2002 (7/1/2002 to 6/30/2003) at a consortium discount rate of 75%.

Shared Resources

There are a number of examples of resource sharing in the Pinal and Gila Counties library communities. In Pinal County, for example, the Florence Community Library is located on the campus of Florence High School and serves both school and community library needs. Central Arizona College provides library catalog services to Casa Grande Union High School. Gila County Library District provides library catalog services to Gila County Community College and shares its Internet access with the Juvenile Justice Center. The Juvenile Justice Center has Plato online curriculum user license that it would like to share more broadly through the county library network.

Library Comments

"Our primary issue with the Cable Internet service is that is loses connection. This past month (Aug. '03) we had 2 occasions of "outage" when we had to call the cable company. On August 7, we were "down" for 40 minutes. This disrupts Internet service to patrons and staff and cuts off

access to the database on which we find materials for patrons and do borrower registration and circulation."
-- *Globe Public Library*

"Internet access is an essential tool to our provision of service. We wouldn't be in business, now, without it."
-- *Globe Public Library*

"When computers for public access are used, working in general slows way down. Also, the process of checking in and out a patron slows down."
--*Arthur E. Pomeroy Library (Kearny)*

10.5 MEDICAL/HEALTH

Health care is a critically important segment of rural economies, particularly in times of economic downturn (when healthcare needs and expenditures typically rise). 1998 per capita spending on healthcare in Arizona was estimated to be $3,100 per resident.
http://www.stopgettingsick.com/templates/news_template.cfm/5989

A more recent national estimate of total U.S. health spending (2002) is $5,427 per capita, with government's share being $3,245 (primarily Medicare/Medicaid).
http://prorev.com/statshealth.htm

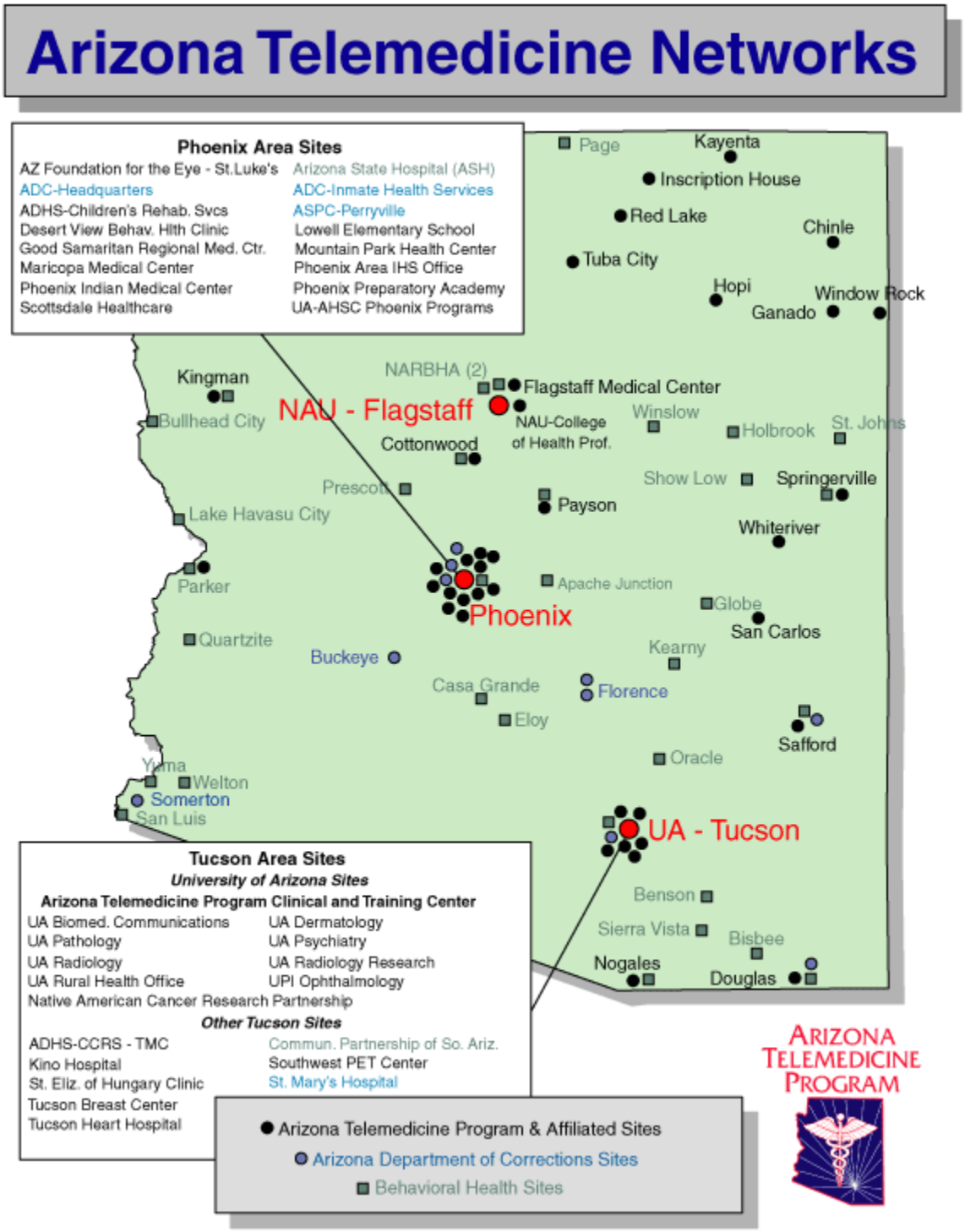
That amounts to approximately $1 billion dollars when multiplied by Pinal County's 2002 population estimate of 192,395 (or $596 million, using the more conservative 1998 figure). For Gila County the numbers would be $287 million using the national estimate and $164 million using the more conservative 1998 figure for Arizona and 2002 population estimate of 53,015.

The challenge to rural communities is to keep this money in the county, or in the case of Medicare/Medicaid, return this money to the county by having a robust local health care business environment that can contribute its revenue to the local economy in the form of quality jobs/salaries, supply and service purchases, and other positive benefits. According to the Colorado Rural Health Center (Snapshot of Rural Health in Colorado, 2003), health care can represent up to 20% of a rural community's employment and income, on average. Telecommunications infrastructure can help rural hospitals survive, sustain the quality and responsiveness of their services, and build revenue. And, last but not least, adequate health care services are critically important to the issue quality of life (particularly for children and seniors) and attracting new business and population growth.

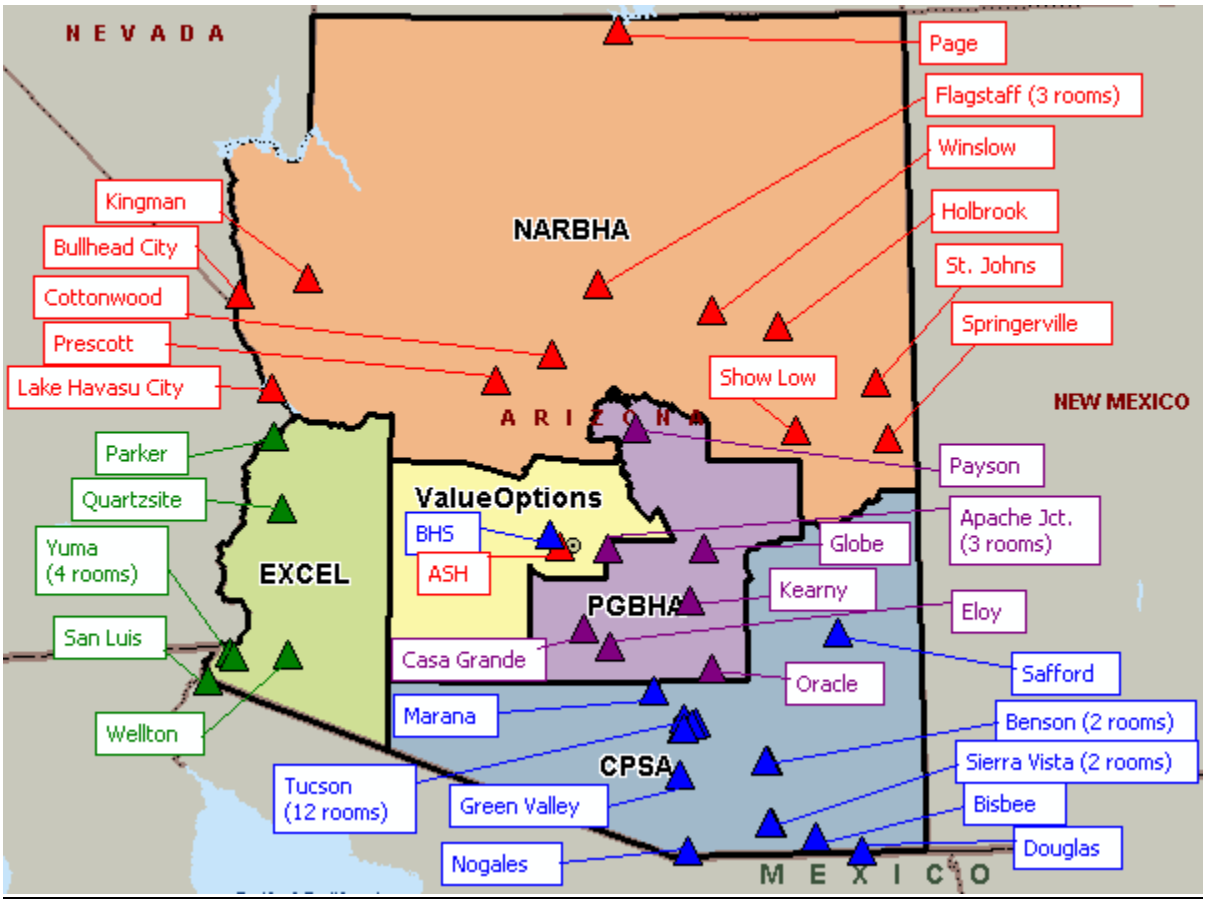
Gila and Pinal counties are benefited by the existence of thriving regional medical centers and several satellite clinics in the smaller, more remote communities. Alliances with the University

Medical Center in Tucson and/or Northern Arizona University have enhanced development of telemedicine applications at Payson Regional Medical Center and Cobre Valley Medical Center.

Telehealth/Telemedicine is an attractive benefit for improved community connectivity, but the financial model for implementing and sustaining it is weak in rural areas where population density is sparse and capital funds for investment in the equipment and circuits necessary may be better used for something else. Reimbursement issues (who will reimburse for what and at what level), and the influence of shifting business and referral network alliances for rural sites also act to limit telehealth development.


Arizona Telemedicine Networks
Phoenix Area Sites
AZ Foundation for the Eye - St.Luke's
Arizona State Hospital (ASH)
ADC-Headquarters
ADC-Inmate Health Services
ADHS-Children's Rehab. Svcs
ASPC-Perryville
Desert View Behav. Hlth Clinic
Lowell Elementary School
Good Samaritan Regional Med. Ctr.
Mountain Park Health Center
Maricopa Medical Center
Phoenix Area IHS Office
Phoenix Indian Medical Center
Phoenix Preparatory Academy
Scottsdale Healthcare
UA-AHSC Phoenix Programs
Page
Kayenta
Inscription House
Red Lake
Chinle
Tuba City
Hopi
Window Rock
Ganado
Kingman
NARBHA (2)
Flagstaff Medical Center
NAU - Flagstaff
Bullhead City
NAU-College of Health Prof.
Winslow
Holbrook
St. Johns
Cottonwood
Show Low
Springerville
Prescott
Payson
Lake Havasu City
Whiteriver
Parker
Apache Junction
Phoenix
Globe
San Carlos
Quartzite
Buckeye
Kearny
Casa Grande
Florence
Eloy
Safford
Oracle
Yuma
Welton
Somerton
San Luis
UA - Tucson
Tucson Area Sites
University of Arizona Sites
Arizona Telemedicine Program Clinical and Training Center
UA Biomed. Communications
UA Dermatology
UA Pathology
UA Psychiatry
UA Radiology
UA Radiology Research
UA Rural Health Office
UPI Ophthalmology
Native American Cancer Research Partnership
Other Tucson Sites
ADHS-CCRS - TMC
Commun. Partnership of So. Ariz.
Kino Hospital
Southwest PET Center
St. Eliz. of Hungary Clinic
St. Mary's Hospital
Tucson Breast Center
Tucson Heart Hospital
Benson
Sierra Vista
Bisbee
Nogales
Douglas
Arizona Telemedicine Program & Affiliated Sites
Arizona Department of Corrections Sites
Behavioral Health Sites
ARIZONA TELEMEDICINE PROGRAM

AZ TeleBehavioral Health Network



The Arizona TeleBehavioral Health Network was developed to provide clinical behavioral health services and related activities (administrative and training/education meetings) via live, interactive videoconferencing. As Northern Arizona Regional Behavioral Health Authority (NARBHA) assisted with each Regional Behavioral Health Authority's (RBHA's) telemedicine network development, it quickly became apparent that there was a need to coordinate telemedicine efforts, at least across RBHA boundaries.

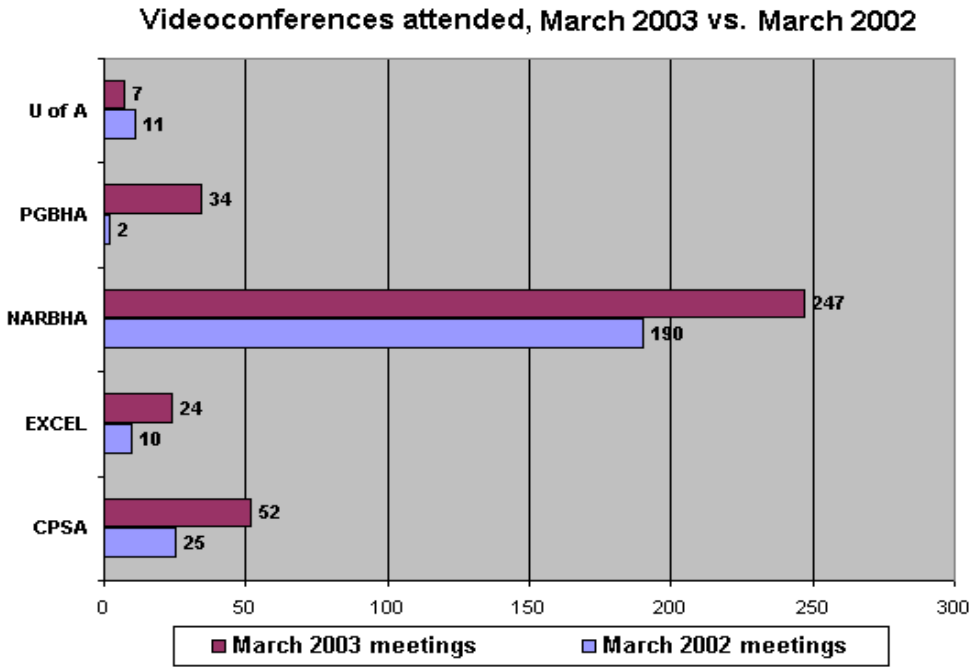
An advisory committee of the Arizona TeleBehavioral Health Network, consisting of representatives from each member agency, meets quarterly to make decisions regarding oversight, expansion, funding, future plans, legislation, public relations, network additions and deletions, changes, how those costs will be covered, and other business matters related to this effort.

In January 1996, NARBHA received funding from the Arizona Department of Health Services to develop a telemedicine system that would enhance the delivery of behavioral health services throughout 62,000 square miles of northern Arizona. The system, NARBHA net, began operation in November 1996, using dedicated T-1 lines between sites and connecting to a hub in Flagstaff.

The first NARBHA sites designated for videoconferencing were Flagstaff, Show Low, St. Johns, Page, Prescott, and a site at the Arizona State Hospital (ASH) in Phoenix. Since then, two additional sites in Flagstaff, along with sites in Holbrook, Kingman, Lake Havasu City, Bullhead City, Cottonwood, Winslow, and Springerville have been added.

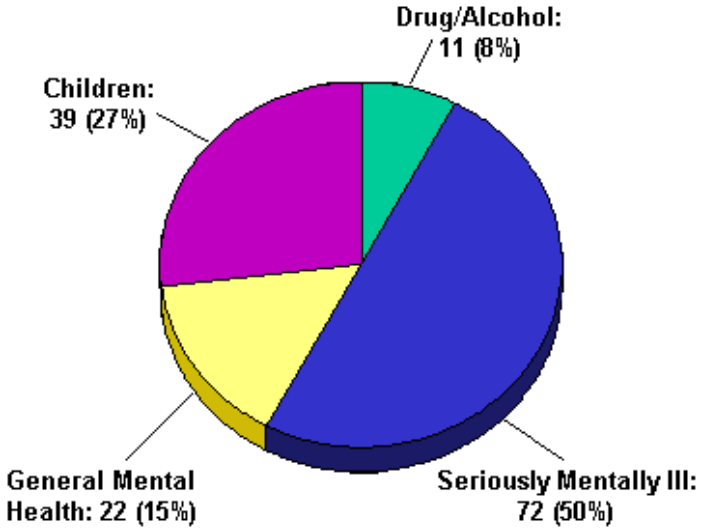
In mid 1998, NARBHA assisted another one of the Regional Behavioral Health Authorities, Community Partnership of Southern Arizona (CPSA), in bringing up its own multi-site network. The two RBHA networks are linked at the Division of Behavioral Health Services (DBHS) in Phoenix, providing a seamless connection between networks. In fall 1998, a third RBHA, Pinal Gila Behavioral Health Association (PGBHA), linked one site in Apache Junction to NARBHA net, becoming part of the growing statewide RBHA network.

In November 1998, NARBHA net established a permanent connection with the University of Arizona's Telemedicine Program, based in Tucson. With this connection, NARBHA has been able to offer its clinics the opportunity to participate in regularly scheduled psychiatric grand rounds and specialty physician consulting. NARBHA and the University of Arizona jointly applied for a grant for shared sites at medical facilities in Whiteriver on the Apache Indian Reservation (1999) and the new Hopi Medical Center in Polacca (2001).


Videoconferences attended, March 2003 vs. March 2002
U of A
7
11
PGBHA
34
2
NARBHA
247
190
EXCEL
24
10
CPSA
52
25
0
50
100
150
200
250
300
March 2003 meetings
March 2002 meetings

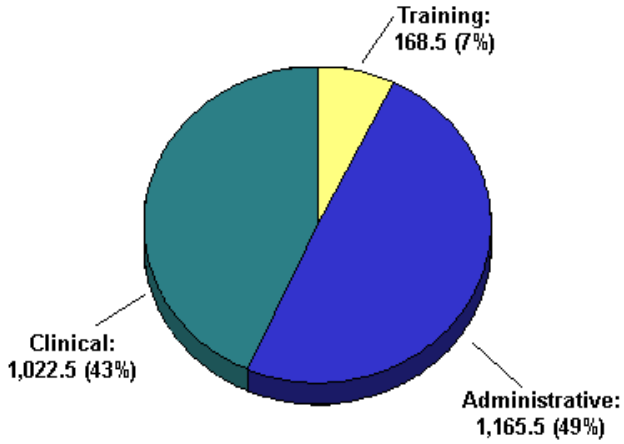
Below are NARBHAnet telemedicine statistics depicting the number of telepsychiatry members served (by program) and the types of videoconferencing activity for all NARBHA sites (Flagstaff, Winslow, Holbrook, Show Low, Page, Prescott, St. Johns, Springerville, Kingman, Bullhead City, Lake Havasu City, and Cottonwood).

NARBHA Telepsychiatry Members Served*
(by program - monthly average)
January - March 2003



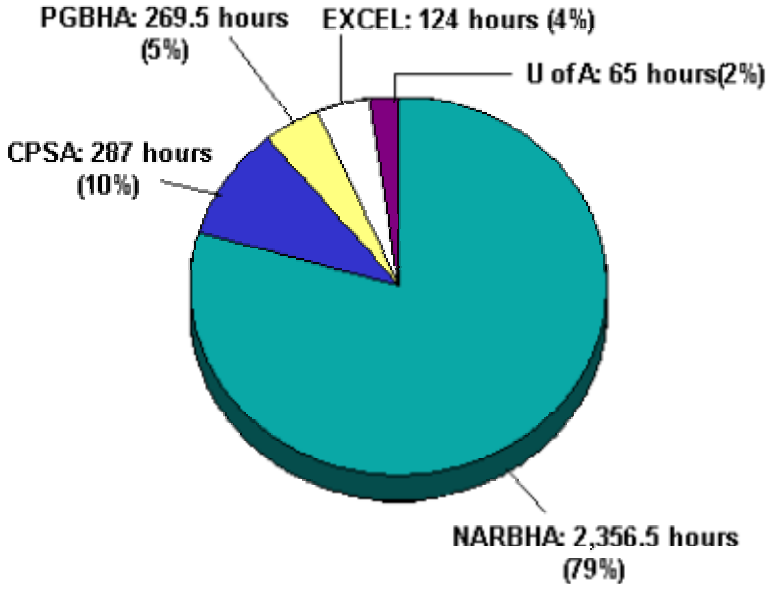
** Actual number of members served per month is higher than shown here due to lags in reporting*

NARBHA Net Videoconferencing Activity
(number of hours spent in videoconferences)
January 1, 2003 - March 31, 2003



The chart below shows use of the NARBHAnet system by all Arizona Regional Behavioral Health Authorities (RBHAs) during the period January 1, 2003, through March 31, 2003.

Arizona RBHAs
Use of NARBHAnet
January 1, 2003 - March 31, 2003
(In Hours)



NARBHA uses Polycom video equipment that was purchased through Wire One Technologies, Inc. The equipment is capable of delivering two-way, interactive video, videotape recordings, and computer presentations. A remote-control unit controls the equipment during use. The camera can be programmed for preset room locations, can be voice-activated, and can be controlled by remote sites (which is useful in delivering psychiatry services).

Any network site can schedule and initiate a videoconference. NARBHA also has the capability to add cascaded sites from other networks broadcasting at differing bandwidths to videoconferences held over the network, and up to four sites can be viewed at the same time with split-screen capability. The system was designed to be user-friendly and does not require technical staff at remote locations. In addition, the system was designed to be flexible, allowing all sites to participate in a single conference, or combinations of multiple conferences occurring simultaneously.

Network end-user sites are equipped with Adtran TSUs accepting the T-1 line from Flagstaff, which feeds into the router, where the T-1's 24 channels are split out for video, data, or voice. The video equipment located at the majority of the NARBHA sites is CLI Radiance 8750s and 8775s, with one VTEL TC2000 and four Polycom Viewstation FXs. These room video units are all equipped with a television monitor and a codec, which translates analog signals into digital signals for transmission over a T-1 phone line, and back again for receiving. This allows a two-way, live interactive video transaction.

Fifteen northern Arizona sites are currently connected to NARBHA net over private, dedicated T-1 phone lines. The network also has the capacity for two primary rate interface (PRI) call

connections to the outside world, and includes T-1 lines to NARBHA's partner agencies. These include one full T-1 path to the Community Partnership of Southern Arizona (CPSA) telemedicine network with multiple sites (including the Department of Behavioral Health Services); three full T-1 paths to the Apache Junction hub of the Pinal Gila Regional Behavioral Health Association (PGBHA) eight-site network; one full T-1 path to the Yuma hub of the EXCEL group six-site network; and one full T-1 connection to the University of Arizona's Arizona Telemedicine Program in Tucson.

All 15 of the NARBHA network sites are internal inverse multiplexer connection type; the U of A is a direct connection. The hub location in Flagstaff houses a N.E.T. IDNX 90 Prime Video Switching system, which allows for private video and data network connections, configured for both on- and off-network video dial-up capability. Dedicated T-1 phone lines from each of the remote site locations connect from local telecommunication carriers into the hub through Adtran TSUs, which carry those 24 channel sets into the IDNX 90, where those 24 channels are then split out, dedicating eight channels for video for each site, one D-channel, and the remaining 15 channels for data and voice applications. The eight consecutive video channels with the one D channel (for voice and video switching) are then fed into the MultiPoint Conferencing Unit (MCU) bridging device, a software-controlled switching device that interconnects H.320-compliant conferencing systems. This MCU permits all 15 sites, as well as sites on connected networks (PGBHA, EXCEL, CPSA) and up to two outside agencies (such as hospitals, universities, out-of-state agencies, or clinics) to participate in any combination of multi-site videoconferences that T-1 bandwidth allows.
http://www.rbha.net/overview.html

Bandwidth is important for any health care application in rural communities, but it is critically important for more advanced telehealth/telemedicine applications such as teleradiology. Here, for example, is a table of estimated transmission times for a range of connectivity bandwidths:

Time required to download a 24 megabyte file of X-ray images (from the Main Street Economist, "The Broadband Quandary in Rural America," August, 2000)	
SPEED	**TIME**
14.4 kbps	3.6 hours
28.8 kbps	1.8 hours
56 kbps	58 minutes
128 kbps	24 minutes
1.54 mbps (T-1)	< 3 minutes
4 mbps	48 seconds
10 mbps	< 20 seconds

As a practical matter, T-1 or fractional T-1 is the only viable bandwidth for applications which require transmission of large files. There are products and services on the teleradiology market that operate at ADSL speeds, and historically, there are some non-radiology telehealth applications, such as home monitoring of pacemaker settings, which have used devices as slow as 150 baud acoustic-coupled modems.

Hospitals

Casa Grande Regional Medical Center is a sizable regional medical center which is currently undergoing expansion. This well-staffed, well-equipped medical facility is near enough to Tucson to obviate the need for extensive telemedicine applications. However, the physicians have identified a desperate need for DSL connectivity at their offices as well as at home to enhance their ability to obtain timely and cutting edge information regarding patient care, pharmaceuticals, disease and diagnosis related information. The hospital provides access via T-1 lines, to a physicians' information service. The hospital has multiple T-1 access, using one for dedicated internet access and the rest for voice lines.

Cobre Valley Medical Center serves the Globe/Miami area. The center has recently added a robotic microscope for use with TelePathology applications to the University of Arizona's UMC site. Technicians are currently being trained on the use of the robotic microscope and its use is anticipated before the end of the year. The medical center does have a dedicated T-1 line for this application. The center used to employ teleradiology, but limitations of dial-up access, and success in attracting a full-time radiologist to join the hospital staff has made the need for teleradiology obsolete.

Payson Regional Medical Center provides an interactive video training facility for physicians to obtain regular continuing education program without having to travel outside the area. The same facility is set up to provide for remote cardiology consults. It recently added the use of robotic microscopy to enhance Telepathology in order to assist local surgeons in determining procedural success. It uses a T-1 line connection to University of Arizona for these applications. Payson also has received e-rate support from the FCC, although such support is not significant.

Hu Hu Kam Hospital serves the Gila River reservation and is located in Sacaton. It was eligible for and received e-rate support funding from the FCC in 2002.

Clinics

Sun Life Family Medical Clinics maintains service for clinics in Casa Grande, Coolidge, Eloy, Maricopa and San Manuel. These clinics are connected via dedicated T-1 lines for video-conferencing. Use of advanced telemedicine applications is not in place at these sites. The San Manuel site is the only Sun Life clinic to receive e-rate support from the FCC in 2002.

11.0 DESCRIPTION OF APPLICATIONS

11.1 E-GOVERNMENT

Simply put, "E-government" means putting information about County and local government online, ideally with fresh reporting of things such as minutes of public meetings and other news items. Some more advanced e-government systems make all forms or application processes available (downloadable or web-based forms) online. There are even hybrids of Adobe acrobat forms which can be downloaded, filled in on a computer, and e-mailed or uploaded.

Beyond a simple website, however, E-government requires expensive hosting, application software, additional staff time, and technical staff support or outside consulting assistance just to get started.

Some government functions, such as tax lien auctions, might benefit from the greater exposure available on the net. Visibility of the website may help in promoting business and residential relocation, particularly if the government entity may be offering some sort of inducements for relocation or if it seeks to promote an airport site, industrial park, or commercial property.

A 2001 study by the University of Maryland reported increasing popularity of e-government usage, with rural users "the most likely to conduct government business online." ("US Net Users Turning To E-government"; E-gateway, 1/18/2002; http://www.e-gateway.net/infoarea/news/news.cfm?nid=2132)

To sum up, some form of Internet presence should be done by municipal and county governments. If it is done, it should be done well, with a well defined selection of useful information for residents, updated regularly, and some information about relocation. Local ISPs may be the best source of assistance in establishing a basic e-government presence. Keep in mind that there will be costs and that it can get very expensive if it becomes elaborate.

11.2 DISTANCE EDUCATION

Distance education includes many things: interactive videoconferencing, streaming media, library network access, and web-based interactive instruction. In its most attractive form, distance education is high-quality real time video interaction between two or more sites. Unfortunately, the infrastructure to deliver this ideal service is not universally available, and in a few places where it is available, it may be priced out of the reach of potential users. In the real world, distance education is typically done within a patchwork of environments shaped by previous grant awards and limitations of previous evolutions of the technology, limited also to a regional or local proximity by programmatic traditions and other resource sharing affiliations.

Even so, given the limitations of an evolving infrastructure, Arizona is very close to the time when County students, vocational/technical education students, college students and "lifelong learners" can enjoy a much greater variety of options for enhancing their educational environment both at school and at home. High school students in Pinal County, for example,

could benefit from technology classes from CAVIT or take advanced placement courses from one of the state university programs, from Arizona Regent's University (http://www.arizonaregentsuniversity.org/classes.htm), or classes from Central Arizona College. Also, as high bandwidth access such as DSL and cable modem begin to appear in homes, the quality and number of options (such as streaming media and real time videoconferencing) for distance education increase. There are three general categories of distance education commonly available:

1. Web based education systems, either as virtual K-12 schools (popularly called "cyberschooling"), the personal computer-facilitated equivalent to home schooling, as a supplement to traditional classroom schooling, or as a home aid for completing high school requirements or college level study toward certification or degree. These systems require only an adequate dial-up connection;

2. Remote, interactive video classrooms, typically sharing physical locations and network connectivity (wired, fibered, wireless, or satellite) with other educational or public institutions; and

3. Broadcast, cablecast, or satellite-delivered video education programs for use at home or in schools.

Web Based School Systems – County

Virtual K-12 schooling programs in Arizona are part of a multi-year pilot experiment called the Technology Assisted Project-based Instruction Program (TABPI). TABPI was established in HB 2093 (see Appendix E for the legislation text and notes). In 2003 the program expanded from four schools - two charters and two district schools - to 14 in all and restrictions on enrollment were lifted. No total enrollment figures are publicly available for the TABPI program, and individual school enrollments are available only in a few cases where the distance learning charter has submitted data that is reported in an SAIS school report card.

There are no Pinal or Gila County districts or charter schools originating virtual school programs, although the proposed Gila Distance Learning Network, expanding access to the districts Plato County software license, is a start towards one.

Distance learning schools in Arizona as a result of HB2093:

The following schools were approved to participate in the Technology Assisted Project-based Instruction Program as described in HB 2093. The Arizona Department of Education maintains one brief web page of information on virtual schools at: http://www.ade.az.gov/stateboard/tapbi.asp

Districts that Provide Distance Learning

1. Mesa Distance Learning Project, Mesa Unified District - http://www.mdlp.org/
2. Deer Valley Unified - Phoenix Special Programs and Academies - http://www.phoenixacademies.org/programs/sites.cfm
3. *Peoria Unified District – eCampus - http://ecampus.peoriaud.k12.az.us/

4. *Tucson Unified District – http://www.tusd.k12.az.us/
5. *Tempe Union High School District - http://www.tuhsd.k12.az.us/tuhsd_main/index.html

* = Newly approved August 25 2003

Charters that Provide Distance Learning

1. PPEP TEC & Affiliates - Arizona Virtual Academy (Tucson; 2003 enrollment: 300+?) - http://www.azva.org/
2. Sequoia Choice School - Arizona Distance Learning School (Mesa; 2003 enrollment 166) - http://scazdl.org/sc/index.html
3. Sierra Vista Charter School, Inc. - Connections Academy (Phoenix; 2003 enrollment: 90) http://www.connectionsacademy.com/state/home.asp?sid=az
4. Phoenix Special Programs, Inc. – Kids Hope Academy (Phoenix; 2003 enrollment: 4) http://www.phoenixacademies.org/programs/sites.cfm
5. Humanities and Sciences Academy of the United States, Inc. – Humanities and Sciences Academy of Arizona (Tempe; 2003 enrollment 122) - http://www.humsci.org/main.asp?page=hsaa
6. Pinnacle Education, Inc. - Virtual High School (Tempe; 2003 enrollment: 35) - http://www.pin-ed.com/virtual.asp
7. Primavera Technical Learning Center – Primavera On-Line Learning Center (Chandler; 2003 enrollment: 70) http://www.primaveratech.org/

Although K-12 virtual schooling is still in its infancy in Arizona, it holds both great promise and some risk for rural communities. The great promise is that it can help alleviate one of Arizona's most pressing educational problems – its rate of high school completion, which as recently as 2002 was ranked 50th (worst) in the nation (http://www.aeanet.org/PressRoom/idmk_CyEd2002_Arizona.asp). The web-based instruction of virtual schools can help expand the number of at-home schooled special populations, such as kids who have behavioral or social problems with traditional schooling, pregnant teens, students prevented from attending school due to illness or injury, and others. Among the beneficiaries of virtual schooling may be the children of migrant agricultural workers who may look forward to better continuity and tracking of their educational services and avoid the problems caused by frequent changes of school and other interruptions. But there is also a downside to virtual schooling: the risk that as it grows in popularity it will redirect state education funding necessary to support the local traditional educational infrastructure.

Currently, there are no virtual schools in either Pinal or Gila County, so virtual schools that enroll pupils from these counties receive approximately $5,000 per student -- money that might otherwise have gone to support services at a local school. Long term, the effects of the growth of virtual schooling could negatively impact economic development by draining funding (and resulting employment) away from local schools. This is more critical in the most rural communities in Arizona where school jobs are among the best and most stable employment opportunities. Note that there does not appear to be a reporting system for virtual school enrollment that tracks students by location, so it is currently not possible to determine how many "virtual" K-12 students there are in Arizona by county.

Web Based School Systems - Higher Education

To anyone who attended a college or university ten or twenty years ago, technology applications that are becoming common on higher education campuses, such as wireless classrooms, faculty-student electronic communication, and electronically delivered courses are astounding. Even more amazing is the potential for institutions to extend their "markets" beyond their geographic locality, literally nationwide. This has brought about interesting branding and intellectual property issues, as well as territoriality issues. Whose students are these anyway?

As with other technology options, higher education distance learning is a two-edged sword. Web based courseware systems allow students who have adequate dial-up access to take courses from hundreds of accredited programs from well-established, well-regarded institutions, as well as from some that are less credible, even if accredited. Students who physically attend universities or college can also take a mix of online and classroom courses to better tailor their schedule, and perhaps not miss a course because of scheduling conflicts or their work responsibilities. This should allow many students who are pursuing degrees part-time to accelerate the completion of their programs.

The tech boom had many bubbles, among which was a "lifelong learning" bubble that presumed that there would be a significant market for corporate sponsored education and training programs. That bubble burst, and the educational training industry refocused on K-12 and more conventional higher education programs (see "Times tough for e-learning," Jane Larson; The Arizona Republic, Jul. 25, 2003; online at http://www.azcentral.com/arizonarepublic/business/articles/0725elearning25.html). One indication of the health of the industry and the growth and acceptance of this technology, however, is the recent report by Phoenix-based Apollo Group, Inc. for the year ended August 31, 2003 that showed net income for their **University of Phoenix** Online (NASDAQ symbol UOPX**)** business increased 71.6% to 110.5 million, compared to $64.4 million for the same period last year. University of Phoenix Online is an international program.

Remote Interactive Video Classrooms

The pioneering role of higher educational institutions in developing the Internet in Arizona, as in other states, resulted in an unusually rich diffusion of innovation, in terms of distance education, to two tiers of constituency: community colleges and K-12 schools. Libraries, museums, and other public institutions benefited as well. The best publicly documented example of this in Arizona is NAUNet, Northern Arizona University's network of distance learning/videoconferencing sites. NAUNet is the backbone of the NAU-Community College Arizona Partnership Plan. Northern Arizona University is working in partnership with Arizona community colleges to deliver fully articulated degree programs using on-site faculty and the interactive instructional television made possible by NAUNet. The following description and illustration shows the extent of NAU's distance learning network:

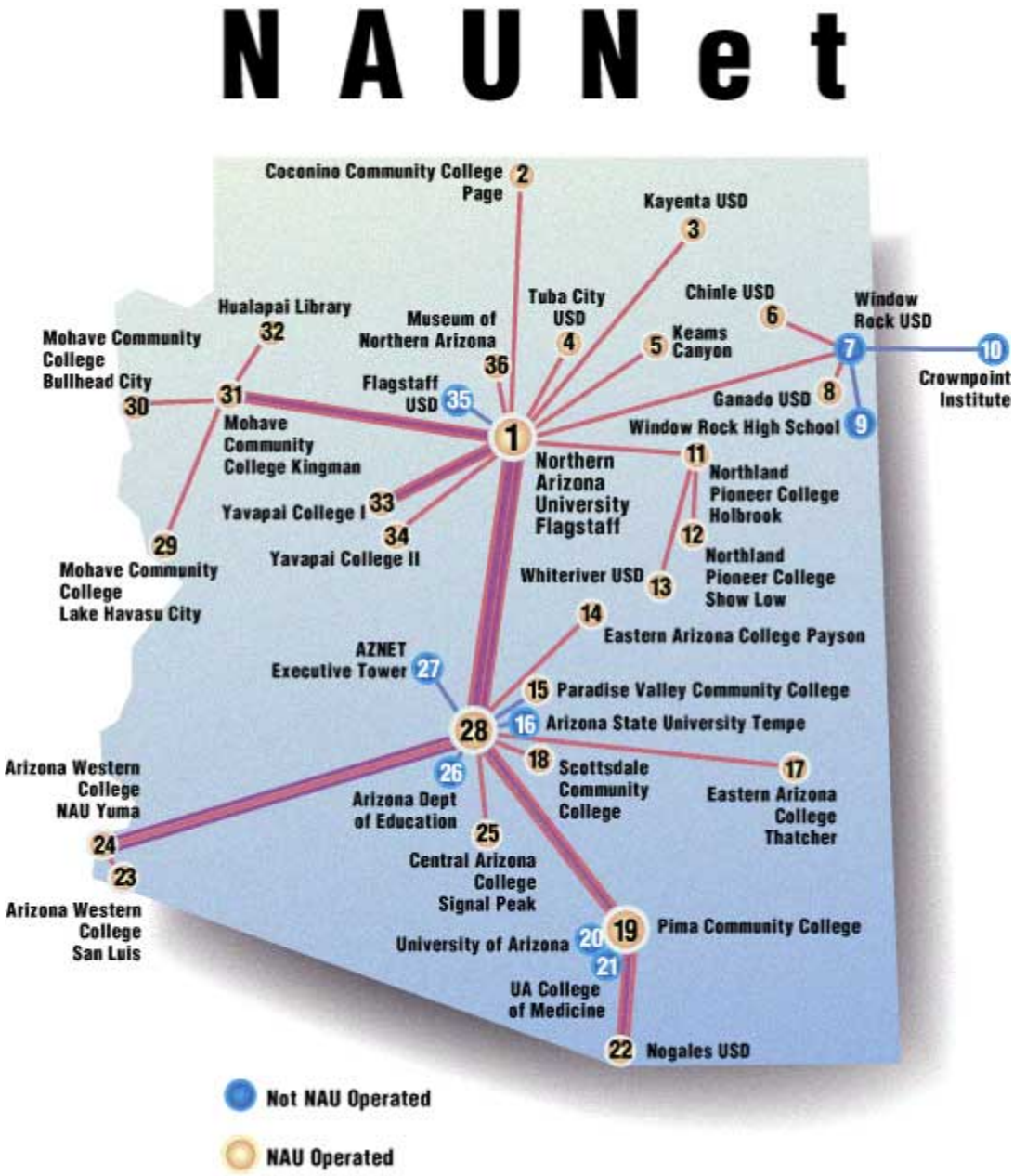
FACTS ABOUT NAUNET (http://www4.nau.edu/iitv/naunet/nnexpfac.html)

- Current capacity of NAUNet sites is 14,976 (head count) students per academic year.

THE NETWORK...is a hybrid of carriage systems and methods, a complex collaboration of telecommunications providers: MCI, AT&T, US West, Citizen's Utilities, Century Telephone, Spectra Site, and Northern Arizona University.

NAUNet employs first-rate, high quality analog and digital technologies—often mixed together in state-of-the-art applications. Technical terms abound—ISDN, FDDI, Ethernet, Internet, Intranet, DS-3, DS-1, modems, codecs, duplex microwave, up-links, down-links—but emerge as a simple-to-use and user-friendly network of highly active communities.

With 34 active sites, NAUNet is the only network in Arizona linking public education and state agency facilities to one another and to many of the state's C-band and Ku-band satellite up-link services, and providing direct links to most of Arizona's major television broadcasting stations and several cable companies.



All three major research Universities in Arizona have distance learning network programs, but NAUNet may be the most extensive. Community Colleges and other two-year programs also seem to have ambitious distance education programs, as well, often overlapping geographically in terms of market presence and frequently sharing infrastructure, down to the classroom level. In many communities this means several educational options at all levels of education from County onward.

A 2002 US News & World Report national directory of E-learning programs profile (http://www.usnews.com/usnews/edu/elearning/elhome.htm) of Northern Arizona University (NAU) distance learning services reported that it offers 68 degree-granting distance education programs, 305 credit-granting distance education courses, and has a total enrollment of 10,419 students. Arizona State University (ASU) offers 7 degree-granting distance education programs, 145 credit-granting distance education courses, and has a total enrollment of 5,182 students. No data were available in the USNWR directory for the distance education program at the University of Arizona.

Northern Arizona University E-learning Web site:
http://www.distance.nau.edu

Arizona State University E-learning Web site:
http://asuonline.asu.edu

University of Arizona E-learning Web site:
http://www.eu.arizona.edu/dist

The Arizona Schools Facilities Board Students FIRST Program upgraded most school districts to gigabit-capable WANS with a single Internet connection at a "DISTRICT ACCESS POINT" or DAP which is typically at the district office. There has recently been some discussion around a controversial proposal by two State lawmakers to consolidate school districts with a goal of achieving management efficiencies and cost savings. The proposal by Reps. Linda Gray, R-Glendale, and Bill Ko-nopnicki, R-Safford, would form a 13-member commission to study the 236 school districts in the state and come up with a specific plan to create a forced marriage among some of them. That plan would go to the Legislature by the end of 2005, which could approve it as proposed or amended and mandate the consolidation.

However, the consolidation proposal has encountered significant opposition, including a negative review from a Goldwater Institute study which found potential cost savings to be miniscule. Left unexamined is the role high bandwidth connectivity could play in consolidation of educational resources. For example, in Phillips County, Colorado, two school districts, Haxtun and Holyoke recently won a RUS grant to establish a gigabit Ethernet connection (provided by their local independent Telco, Phillips County Telephone, a coop) spanning the approximately 20 mile distance between their campuses. This will allow real-time connectivity for classroom education and other purposes between the campuses, including the sharing of certified staff, a key problem rural schools face in the requirements of the No Child Left Behind Act. Awareness of these efforts, applied to the infrastructure issues of rural Arizona, may spur State attention to K-12 network infrastructure development.

Also unexamined is the potential for sharing distance learning and videoconferencing capabilities with local governments, a topic which may be addressed by the continuing efforts of the Pinal Gila Telecommunications Partnership.

Broadcast, cablecast, or satellite-delivered video education

The current state of broadcast, cablecast, and satellite-delivered video education in Arizona is outside the scope of this report. However, the shift from analog to digital technology (from H.320 to H.323), advances in compression and storage capability and the diffusion of higher bandwidth connectivity is expected to increase the audience for programming that was formerly delivered via broadcast, cablecast, or satellite, toward the long-awaited goal of video on demand (VOD). Internet delivered video (IP Video, H.323), however, still has many performance problems, particularly in networks where latency is poorly controlled (most frame relay networks) and in the heterogeneous environment of new network security controls and the now ubiquitous firewalls.

Ideally, internet-delivered video will allow enhancement of web-based educational systems by allowing students to view (or listen to audio) streaming lectures. Streaming media allows "time shifting" for students who cannot partake of a scheduled interactive video session.

Trends

Central Arizona College and CAVIT have extensive ITV networks that support classroom learning in most of Pinal County. Gila Community College also provides ITV classes, although it has fewer resources, a much less capable network infrastructure, and more challenging geographic problems. In all cases, local development of instructional support is favored and each organization has active plans to extend its networked program access to additional sites, including most high schools.

In the short term, video technology favors local and regional distance learning development. In the long term, increasing bandwidth will eliminate point-to-point and point-to-multipoint connectivity issues for both net connected school sites and the individual home user. This increased audience should have the effect of increasing product and variety for users, as well as the market for student participants in programs offered by Gila and Pinal County institutions.

Other Resources:

Online Learning Update
http://people.uis.edu/rschr1/onlinelearning/blogger.html

Eschool News Online http://www.eschoolnews.com/

Distance-Educator.Com http://www.distance-educator.com

GAZEL (Global Arizona E-Learning) http://www.gazel.ws/news_&_events.htm

Summary

The distance learning business may be on the cusp of rapid development (due to technology improvements and increasing program options). Continuation of the Pinal-Gila Telecommunications Partnership, and active participation in it by educational institutions should work to protect the capabilities, branding, and programmatic potential of local educational programs. This will help to keep educational revenues local, improve the educational status of the regional workforce, and generate more education jobs.

With a demonstrated history of collaboration, Pinal and Gila County educational institutions should look for additional infrastructure sharing opportunities wherever possible. Some school districts may have heavy leased circuit expense for their Students FIRST network designs. If so, these districts should look for community level shared infrastructure (such as dedicated fiber or wireless) to reduce these costs and increase capabilities.

11.3 TELEMEDICINE

Telemedicine, in abstract, is probably the most commercially viable use of broadband network technology today, particularly within single corporate networks. In practice however, outside large healthcare corporate networks, there are several limitations that continue to hinder its effective use. Trends in the technology are toward lower cost for hardware, software, and connectivity, but file sizes and real-time video (for such applications as sonography and telepathology) are leading a trend toward greater bandwidth requirements. Low population density in rural areas, in general, delivers a low incidence for specialty applications and broadest use of the most simple diagnostic applications, generic teleradiology, face-to-face videoconferencing, continuing medical education uses, or simple visual applications. Single T-1 connections, still unavailable or unaffordable in many rural communities, are beginning to seem like a small amount of bandwidth.

A number of Arizona's rural hospitals have video conferencing capability, and the majority of those are using H.323 terminal equipment. This means that those sites familiar with some sort of telehealth practice are currently IP-ready, that is, prepared to take advantage of new video/multimedia capabilities of the Internet. This is a significant advantage because the trend toward H.323 technology will allow telemedicine consults to scale down to easy and direct PC to PC desktop conferences, broaden the use of the technology, and encourage technical resource sharing and other potential new business relationships among formerly competitive organizations. The few remaining sites still employing H.320 equipment (an old videoconferencing standard designed for use in a pre-Internet environment with dial-up or dedicated circuit technology, such as ISDN) remain at a communications disadvantage. For example, while the Payson Regional Medical Center (which uses H.320 technology) is connected to a bridge at University of Arizona Pathology Department at the Health Sciences Center, it is not as simple a matter for them to connect to other hospitals in the Phoenix area. This dedicated technology limits the variety and ease-of-use of connectivity options available to these sites. But a greater limitation, in the near term, is that the smaller, more remote health clinics without videoconferencing capability cannot be connected to any other location at all. And hospitals

with dedicated circuits must use their bridges to get to the other hospitals with videoconferencing capability. This may require a connection across several networks, involving several network administrators, not an insignificant investment in time and personnel costs.

There is also an economic reality working against telemedicine in that health care providers are often competitive businesses and their support and referral relationships to and from rural areas are meant to be fixed (and so protected from competition) business relationships. A network environment that allowed any site to interact with any other site would undermine this business relationship. So any incompatibility or barriers to ease communication outside a fixed relationship are positive values for the primary healthcare business and serve as "handcuffs" to the smaller referral partner.

The good news is that the University of Arizona Health Sciences Center maintains a robust network of 160 remote sites across the state, the largest numbers of which are H.323 equipped. This telehealth networking is still done largely via dedicated T-1 connections where available. The most common application employed on this network is teleradiology, using store and forward technology as opposed to real time consult. A few sites (Payson Regional Medical Center and Cobre Valley Medical Center) are using real time telepathology which demands significant bandwidth availability. The NARBHA network is still using H.320 technology but has plans to upgrade in the near future to H.323.

The future of telemedicine (perhaps as soon as 2010) is for Internet-based open network environments, increased reimbursement, and broader access to network-supported diagnostic technologies in primary care, rural, and first provider environments.

Efforts are under way to expand the use and reimbursement of telemedicine nationwide. The American Telemedicine Association and other industry groups are actively lobbying for adding nursing homes, for example, to the list of service types that are reimbursable under Medicare telemedicine regulations. In the current Congress, under the recently-introduced HB 1940, by Rep. Doug Ose (R-Calif.), rural telemedicine programs would get $40 million a year in grants through 2008. The bill also expands Medicaid reimbursements for telemedicine services to include inpatient services. This legislation would also allocate funds to develop and expand telemedicine systems to help improve preventive and diagnostic care access in the nation’s rural areas. HB 1940 as well, expands technology beyond demonstration projects and eases licensing barriers for physicians practicing in multiple states.

The Health Resources and Services Administration of the U.S. Health and Human Services Department have also announced the availability of funding for Regional Telehealth Resource Centers. Estimated amount of the competition is $500,000 with 2 awards anticipated. Funding will be awarded on the following factors:

- If there is a record of success in providing telehealth services to medically underserved populations
- If there is a record for collaborating and sharing expertise with providers of telehealth services at the national, regional, state, and local levels

- If a broad range of telehealth services are offered such as a variety of clinical services, patient, family, health professional education
- Rural residency support programs
- Informatics

There are also a number of other telemedicine program opportunities in the US Department of Agriculture through its Rural Utility Service Distance Learning and Telemedicine grants program. In 2003, USDA awarded $32 million in grants to 42 states.

Text of HR 1940 **Telemedicine Bill (108th Congress)**
http://www.house.gov/ose/PDF/Telemedicine.pdf

American Telemedicine Association **News page**
http://www.americantelemed.org/news/newres.htm

Association of Telehealth Service Providers **website**
http://www.atsp.org/

Health Resources and Services Administration **website**
http://www.hrsa.gov/

USDA Rural Utilities Service **website**
http://www.usda.gov/rus/telecom/index.htm

Arizona Telemedicine Program **website**
http://www.telemedicine.arizona.edu

11.4 Economic Development Potential

With greater high-speed telecommunications available, the last component needed to enable aggressive economic development for Gila and Pinal Counties will be in place. The Counties will be able to offer to new businesses:

- ✓ Advanced telecommunications infrastructure
- ✓ Access to a major highway
- ✓ Access to an international airport within three hours
- ✓ Close proximity to a metropolitan area
- ✓ Solid, educated workforce
- ✓ Wages much lower than in large metropolitan areas like NYC, Chicago and LA
- ✓ Good quality-of-life

The time period during which potentially new telecommunications infrastructure is put in place or the existing infrastructure is expanded is a great opportunity for key leaders to diversify the County's economic base by "selling" the positive attributes the counties can offer, including advanced telecommunications, to companies wishing to move to the communities.

For example, if a community is interested in attracting additional call centers, there are trade shows where people who own call centers and localities who wish to have call centers can meet. The County, municipalities, Economic Development Office and Chamber of Commerce can offer an incentive package that might include low interest loans, possible financing, an easy governmental process, advanced communications and an excellent quality of life. Another "clean industry" might be software developers since all they need is high-speed telecommunications.

11.5 E-BUSINESS

Telecommunications capability is a key requirement of any relocating business, but although large business relocation, call centers, and other job creation concepts are among the goals of rural telecommunications infrastructure development, e-business can be conducted by users with only the most basic of network connections.

E-businesses without real world storefronts or what are called "bricks and mortar" sites are common. There are a number of businesses hosting services available via the Internet. For example, a person could start a specialty used or collectable bookstore around an inventory of books stored in their house or garage arranges to have the books listed in an online database at ABEBOOKS.COM (one of many online used book selling services) and fill orders via e-mail and postal or UPS delivery.

These online "storefront" services provide listing, "shopping cart," and secure payment capabilities for a number of specialty markets, including agriculture (see haysellers.com), and perhaps most commonly for real estate. Few require more than dial-up network connectivity and a digital camera (plus host fees) to get started.

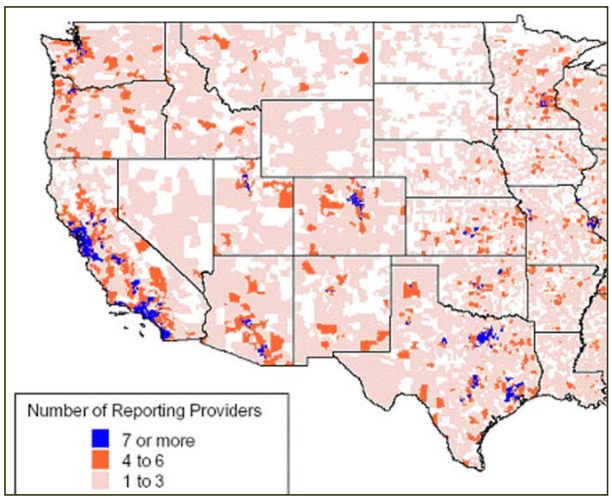
The most popular online marketplace is Ebay.com, which offers specialty subcategories (approximately 8000 items in ***Agriculture***; popular place to find an old tractor) and training for new users who want to become sellers. Many antiques dealers now get a significant portion of their sales from online auction houses such as Ebay. Ebay even offers online and in-person training courses (and there are several books) on how to start your own online business using their service (see http://pages.ebay.com/university/).

So e-business in rural areas does not have to be a call center or other large business relocation with significant government investment and costly incentives, it can be a couple of hundred small businesses springing up in rural homes. Just as in business in general, the ratio of small business startups to large businesses is significantly higher, as is the failure rate, but small business creation is much more accessible now via Internet services. Rural governments need to promote these kinds of activities to attract revenue and to demonstrate the role that the Internet can play in their local economies.

11.6 TELECOMMUNICATIONS AND AGRIBUSINESS

Just like any other business, agribusiness needs to continually stay competitive, both in this country and in a global marketplace. Most non-agribusinesses have long ago "computerized" and are spending more and more time online operating their businesses and marketing their products and services. This need for increased reliance on telecommunications services has been met in metropolitan areas with the installation of thousands miles of fiber optic cable installed in metropolitan areas today.

Although, there is no shortage of agribusiness applications that require broadband connectivity, the rural areas in the United States are generally not "connected." The map below provided by the Federal Communications Commission shows Zip Codes that have broadband access providers, (The FCC defines broadband as transmission rates of 200 Kbps or above). The "pink" areas have from 1-3 providers. The white areas have no broadband access providers. We do know that where broadband access is available, rural users and especially farmers/ranchers will take advantage of these services.



Internet use by U.S. farmers has grown rapidly, as advances in technology make the Internet more accessible. Use of computers on farms has grown from 38 percent of all farms to 55 percent since 1997, while Internet use has grown from 13 percent of all farms to 43 percent. In 2000, 24 percent of farms used the Internet as a management tool in their farming operations, including $665 million in online buying and selling.[35]

As part of the food supply chain, agribusinesses need to more efficiently respond to customer needs and produce food products more efficiently. This is true for any enterprise that is part of a "supply chain." Internet connectivity offers low cost instant communications with many more parts of the supply chain channel. As with many industries, the Internet brings suppliers closer to end-users. Recently, there has been a decline in the number of wholesale distribution channels in the fresh fruits and vegetable sector of the agribusiness industry directly attributed to the use of the Internet.[36]

Access to real-time data and extensive research information can prevent or reduce costly problems and reduce risks to agribusinesses. The value of just a few of these applications can exceed the cost of many advanced telecommunications services.

[35] Economic Research Service, U. S. Department of Agriculture, November 2001.
[36] **Agribusiness and Hypercommunications Needs,** By Dr. Dean G. Fairchild

Some of these valuable applications are below:

Problem	How Advanced Telecommunications Access Will Help
Weather, insects, disease unpredictable	More real-time information could mitigate effects resolve problems faster
As products become ready for market knowledge of changing market prices is important	Keeping producers informed as to the value of their products helps producers better judge market cycles
Producers depend on external market variables for values	Real-time price movement helps producers keep pace with changes
Producers market is more global	Advanced communications keeps producers positioned globally
Agricultural equipment has been hard to liquidate and continues to be expensive	Online auctions may make equipment more liquid and lower overall prices
Government policies and changes	Direct connections to State and Federal Government web sites to stay informed
Agribusiness chemical use and environmental impact	An important topic that needs to be reviewed in real-time
Cooperative Agribusiness approaches	When dealing with a regional issue such as disease or pests, community-based information sources may be critical
Agribusinesses always looking to lower costs	Online purchasing of fertilizer or other items required for the business
Problems with crops, soils, weather	Access to university and government reports could help solve problems

High-speed Internet access can also play a major role in "precision farming." Precision farming uses many data points to help determine how to make each field more productive. Moisture content, soil types, weather conditions and many other variables can be modeled to determine how each field can be matched and managed to deliver the best result for each type of crop. For example, a software program called *Power Agronomy* tracks farms, fields, chemicals, crops, weeds, diseases and insects by inputting daily field visits into the program. Results showing the status of the fields and suggestions to deal with problems are available with the click of a button. http://software.powertekgroup.com/power_agronomy/default.html

Agribusiness is an integral component of parts of Gila and Pinal counties' economies. The advantages to farmers and ranchers gained through use of the Internet are important; in fact, the advantages to smaller farmers and ranchers are more valuable than to larger agribusinesses. Therefore, the availability of advanced telecommunications services is critical to support this key segment of this economy and keep it competitive.

12.0 TECHNOLOGY PLAN

Unfortunately, a development plan for wide-area telecommunications technology does not start with a clean sheet of paper. Instead, the plan must begin with an overview of the myriad of commitments by potential participants, the technological heterogeneity of systems in place, the complex of vendor relationships, the variety of missions and agendas to be encompassed, and important security issues. This report and plan is only the beginning of such an overview. The Governance Section of this report provides some suggestions for how this ongoing responsibility might be addressed by a continuation of the CTA Partnership.

12.1 CONCEPTUAL DESIGN OF NETWORK

12.1.1 Coherence – Convergence

The most important task in developing a technical plan is for each participating organization to examine the current shortcomings of its own collection of telecommunications services that have probably been purchased piecemeal and assembled over time into a semblance of order. If it is possible, the organization must begin to find commonality with other stakeholders in its area and try to determine how in both the near and long term it can continue to improve the coherence of its purchasing and operating processes for telecommunications technology.

The model of coherence sought is similar to the anticipated "convergence" of communications technologies which is driving both the IT and telecom industries. For example, in many organizations, the IT, business, and telecom functions were once discrete entities whose domains had little or no functional overlap. Today, in E-government for example, these functions must be integrated and must together approach new issues, such as online security, that did not exist a decade ago. In five years, the public telecommunications infrastructure used by all stakeholders may have converged in a similar way.

12.1.2 Goal: Alignment

Any organizational or group plan must also have a goal in 2-5 years of aligning itself (to whatever degree possible) with statewide, regional, county-wide and local initiatives. The Arizona Department of Commerce has produced an excellent white paper title, *Statewide Economic Study 2002, Arizona's Telecommunications Infrastructure, July, 2002.*[37] This paper describes the official stance on the direction the State would like to take with regard to telecom. A meeting was held January 27, 2004 titled *Recommendations and Legislation to Promote Broadband Development in Arizona.* In the meeting notice, the Arizona Telecommunications and Information Council (ATIC) stated that:

> Committees are drafting plans and legislation to promote broadband deployment throughout the state including:
>
> 1. A Broadband Development Authority

[37] http://media.centerdigitalgov.com/PDF/State_of_Arizona_Roadmap_final.pdf

2. A Statewide Telecom Roadmap/Plan and Roundtable
3. Expediting access to local, state, federal and tribal rights-of-way
4. Continuing and expanding funding for the Community Telecommunications Assessment Initiative under the Arizona Department of Commerce.

> This meeting will particularly focus on the legislation to implement the Broadband Development Authority that will provide incentives and low cost, long term financing to encourage private sector development of redundant, middle mile and last mile telecom solutions in the state. The purpose of this meeting is: 1) to engage all interested parties, 2) to ensure that they are informed about the content of the proposed recommendations and legislation; 3) to seek their comments and support.[38]

The payoff for this effort will be lower purchasing/ownership costs, more rapid introduction of new applications, better return on investment, and the elimination or reduction of external barriers to development.

12.1.3 Discovering Value

An aggregated approach to infrastructure development can also help all participants discover value in potential partnerships for resource sharing. One participant may have an over-capacity that can be shared, and another may, by sharing that capacity, provide a cost savings for both. For example:

- The Central Arizona College/Central Arizona Valley Institute of Technology (CAVIT) distance education network can collaborate with Pinal County government's need for a microwave link from Florence to Casa Grande.

- CAVIT has a 54 Mb ITV link from Florence High School to Coolidge High School, from Coolidge High School to CAC, and from CAC to Eloy.

- CAC has a three-story residence hall with a line-of-sight from its roof to Casa Grande. The CAC residence hall has a CAC campus fiber connection. This would provide an inexpensive antenna site for wireless connectivity to Casa Grande. CAC could provide technical assistance, include the County government effort in its next RUS Distance Learning grant proposal as a participant or matching effort, and look at other ways a CAC/Pinal County government collaboration could benefit both parties.

Such a link would provide the initial bandwidth to add Pinal County to the SACCNet project and would shorten many dedicated T-1 links the County now maintains with municipalities. The link would also provide a broadband connection to CAC's facilities in Casa Grande and lower the cost and improve some of its outlying links to places such as Maricopa and Eloy. SACCNet can provide both a model and the documented cost-saving justification for such allegiances.

[38] http://atic.researchedge.com/pr/pr040127.html

12.1.4 Renewed Vendor Relationships

At the same time, a technology plan does not mean that old vendor relationships need to be abandoned. In fact, in the short term, becoming a better customer (by better aggregating an organization's telecommunication purchases) and simplifying business processes with existing vendors may be the surest way to increase the value of an organization's investment in telecommunications technology. This is also an opportunity to resolve technical, service, or billing issues with a vendor while informing them of unmet needs or added value that the organization may be seeking in the organization's next cycle of development. An informed vendor can provide the valuable input about their intentions that is necessary for any technology planning process.

12.1.5 Levels of Effort

Technology planning for telecommunications infrastructure development in Pinal and Gila Counties should encompass six levels of effort:

1. Wide area public infrastructure development – new construction either by existing vendors in response to the plan requirements of an aggregator entity or by a public entity. This would include Partnership facilitation of the Southern Arizona Communication Consortium Network - SACCNet;

2. Smaller scale (but more than a single city) point-to-point public infrastructure connections/sharing between members of the CTA aggregate group (city to city, educational WAN to local government WAN, etc.);

3. Community-wide (single city) multi-user (education/healthcare/government) WAN development;

4. Community level non-vendor point-to-point connectivity;

5. Participant level LAN/WAN development;

6. Discovering business/legal processes (such as a common IGA for telecom resource sharing) that will facilitate the benefits of aggregation.

Methodologies of funding or shared business processes are a critical issue that can best be addressed by subcommittee or task force assignments within the ongoing process of Partnership governance. This may include taking advantage of the processes proposed in the Arizona Broadband Development Authority legislation currently in draft form (at GITA).

12.2 PINAL AND GILA COUNTIES – GENERAL RECOMMENDATIONS

Shared purchase of network access and distribution of this access to and aggregation of consortia participants is the method most commonly used to provide more value (*i.e.*, higher bandwidth for the dollar) for network connectivity users. It typically involves identifying the central agent for purchase of the service (and may require letters of agency from participants) and a contract for participation that is often characterized as an intergovernmental agreement or IGA.

Inter-governmental Agency Agreements or IGA's are becoming more common in rural communities across the US in an effort to buy in volume to reduce the cost of telecommunication services, in many cases lower than existing State contracts. Several communities in Colorado and Arizona have entered into such agreements.

A low risk approach to start this process would be to release a joint RFP for cellular and pager services across all communities in Pinal and Gila counties, if possible.

A recently developed IGA plan to partner for shared telecommunications goals in a three county region of northwest Colorado has been extremely successful. The key to success is the open dialogue and willingness to plan together. IGA's can be as simple as the one created for a city-wide fiber optic loop project in Ft. Morgan, CO, that shares the cost of a DS-3 Internet connectivity across all eligible beanpole grant fund entities connected to it.

In the Ft. Morgan project, the County was awarded $285,000 in grant funds to assist eligible entities in connecting the final mile to the Colorado Multi-Use Network (MNT). The City of Ft. Morgan has built a citywide fiber network and will manage, maintain and handle billing for the community. The cost of the DS-3 and hardware maintenance will be divided and distributed to each entity. This has enabled the entities to operate on a gigabit fiber network and have 10 MB of Internet access at less than one-third the cost of a T-1.

An example of a statewide IGA process would be the Colorado *Front Range GigaPop* (FRGP) http://www.frgp.net operated by National Center for Atmospheric Research (NCAR). This internet access co-op allows all state agencies, as well as public agencies connected to the MNT, to participate in the volume purchase agreement through contractual agreements that are effectively IGAs.

Benefits of Shared Purchase of Network Access:

- Starts the IGA process, which could lead to other volume purchase agreements, which would foster the development in most, if not all communities.

- Investigate adoption of the IGA process /resource sharing agreements that SACCNet is using with the state and local governments (use a common form or template whenever possible to reduce administrative overhead).

- Larger volume purchases will have a direct relationship to lower costs and may also add value (including simplifying service relationships and business processes) whether or not costs are reduced.

- With a larger customer base, the potential service provider can be influenced to deepen its coverage area and provide additional services such as wireless data and free phone-to-phone calling.

Risks:

- Very low risk of transition to new provider.

- Long-term cellular contract may be in place in many communities.

- Coverage areas may not extend to the very remote communities.

12.3 General Recommendations for Cities

12.3.1 Petitioning for Service

All Qwest-served cities and towns in Pinal and Gila County should consider petitioning for DSL service. Qwest has been very progressive in 2003 in announcing DSL availability in many smaller communities around Arizona. Also, the technology for extension of DSL service has become more affordable and has made serving smaller communities more attractive from the standpoint of return on investment. Petitioning is a documentary form of community aggregation that says "It's not just a good idea. There are customers here." Qwest has recently shown increasing interest and responsiveness to grassroots forms of market development.

12.3.2 Communication with Developers and Vendors

Municipalities and County Governments should also develop a common practice of communicating with developers early in their planning processes to inform them of how they can add information infrastructure to their plans. Telecommunications infrastructure needs to become as much of a necessity for new commercial and residential development as sewer connections, power, and roads. The municipality may also consider offering incentives to developers that provide telecommunication infrastructure that aligns with community uses (DSL instead of satellite, for example) and helps build the local broadband market.

Cities also must pay attention to where their infrastructure development orientation originates. This can be done by paying attention to how vendor's route existing traffic (Maricopa's frame relay circuits are routed to Casa Grande, for example) and how infrastructure development is taking place in immediately adjacent portions of bordering counties (ATM availability in portions of Maricopa County near north central Pinal County).

Municipalities in areas of the counties which appear to be either "written off" or of very low development priority to their dominant provider should work with the Partnership by drafting targeted RFI's soliciting infrastructure development proposals from competing vendors.

12.4 Pinal County Government / Florence Recommendations

The Pinal County Government information technology infrastructure is well designed and technologically advanced compared to most rural communities that we have worked with. From a technology perspective, the infrastructure is migrating towards a fully integrated voice and data IP network within the Florence area, with plans to expand to the outlying county offices over the next 3-5 years.

The recommendations for Pinal County Government will focus on cost saving opportunities, aggregation possibilities with surrounding communities and local fiber builds.

The Southern Arizona Communication Consortium Network or SACCNet project poses some interesting opportunities and at the same time the LATA changes underway at Qwest offer different, yet significant opportunities as well. The following recommendations will focus on the Pinal County infrastructure alone.

12.4.1 Qwest

Qwest has been aggressively re-engineering their approach towards business in general. Qwest has filed, and been approved, to serve Arizona with Intra-State long distance which will open the door for LATA boundary adjustments in the near future. With Pinal County currently using Qwest Frame Relay services to connect to their remote locations, *we highly recommend a formal business meeting with Qwest and their sales engineering staff to see what can be done to better serve the county, reduce costs, and prepare for the deployment of advanced services (VoIP) as well as other applications on the horizon.* If not satisfied with the results of the Qwest offer, then we would recommend a RFP be developed to shop the market place for these services, as well as potential new services such as ATM, to support your strategic plan.

Recommendation Benefits:

- Developing a working relationship with Qwest directly, at a higher planning/policy/government relations level will enable Qwest to provide engineering support to help Pinal County drive the Qwest network towards the specific needs of the county. This level of support is not available through the re-seller.

- Reducing the cost or increasing the service at the same cost will benefit the county.

- If the RFP path is chosen, this will open the door to possibilities that may have individual benefits in some locations and may drive Qwest to the next level of service, or cause

Qwest to "fill in the blanks" of its infrastructure.

- The current reseller will have an opportunity to bid on the new services if the RFP path is chosen.

- The current reseller for Qwest that has been supportive may not have an opportunity to bid if the direct relationship with Qwest is chosen.

- If the RFP path is chosen and a new service provider is awarded a contract, there are many risks involved in transitioning from one provider to another. Planning the network conversion in detail is imperative.

- Voice services should be included in all transactions.

12.4.2 A Pinal County Telecommunicatins Backbone

We recommend that the Pinal Gila Telecommunications Partnership consider establishing a telecommunications backbone that extends from Casa Grande to CAC/Coolidge and then on to Florence. There are currently two major options for such a development:

1. A 45 Mbps (DS-3) microwave wireless system (or a system built on sharing the current ITV wireless network of CAC/CAVIT) from Casa Grande to CAC, to Coolidge, and then to Florence; and

2. An approximately 30 mile aerial fiber optic link between Casa Grande and Florence, with a path determined by best-possible rights-of-way (where the poles and potential users are).

Such a backbone would be valuable even if it did not have a larger regional network to connect to, which it does in the form of the Southern Arizona Communication consortium network (SACCNet). However, it is important to note that a fiber optic link could potentially have a greater economic development impact along its route, and would provide dramatically faster connectivity (gigabit Ethernet) than a DS3 microwave link.

Another possible scenario would be to view the two possibilities as phases of a larger development strategy: an initial microwave DS3 backbone connection which eventually becomes the redundant path for a fiber optic link which is built within 5 years. The announcement of a backbone plan such as described above may also motivate a vendor to build or disclose infrastructure in advance of the Partnership project to capture the business. If a fiber optic line were built, its additional capacity could also make customers of vendors and other entities that would be interested in capacity along this route.

12.4.3 Southern Arizona Communication Consortium Network (SACCNet)

The SACCNet project poses some very interesting opportunities for Pinal County as well as Coolidge, Florence, Casa Grande, Maricopa and Eloy. The proposed build of the fiber from

Florence to Casa Grande is estimated at $300k. This is a quote from a SACCNet presentation on an aerial fiber build at $10k per mile. In the discussion we had with SACCNet, it was agreed that it would be more in the range of $15k per mile when the final engineering is completed. This 30 plus mile fiber build does not include CPE equipment such as add-drop electronics or routers at all locations.

We recommend that the county compare costs of building and maintaining its own wireless (Licensed Microwave) network between Casa Grand and Florence to other options, including:

1) Collaborating to extend and share the bandwidth of the current ITV wireless network in place at CAC/CAVIT;

2) Partnering with Telespectra (the microwave wireless network provider for Central Arizona College and the wireless DS3 provider for SACCNet between Safford and Phoenix); or

3) Building the 30 mile link required the SACCNet fiber network; or

4) A combination of the above options, such as 1 and 3, as near-term and longer-term phases of development.

The analysis must be comprehensive enough to include the costs of construction, maintenance, leases, electronics technical support and manpower to justify any solution. An analysis should also include whether or not the creation of a separate entity, such as a legally-established cooperative or non-profit coalition would be necessary to share existing infrastructure with CAC/CAVIT or to share whatever arrangement is eventually decided upon and built. A 10 year analysis is recommended in any fiber vs. alternative service analysis. A RFP with a detailed requirements document is recommended to obtain firm pricing from all involved.

With either of these network solutions, the aggregation benefits, bandwidth and cost savings, for all of the communities involved should provide a cooperative environment to work on a common shared-access IGA and funding.

Benefits

- A detailed cost analysis for budget approval
- Potential cost saving in fewer, shorter T-1's linkages to outlying locations
- Improved bandwidth access and lower costs for County linkages to key sites such as Coolidge and Casa Grande
- Reduction of voice services cost using VoIP (and perhaps shared purchase of software/phonesets/hardware) to all county locations

- Enabled new application development and sharing of access costs between cities, county and state offices

- Grant dollars may be obtainable for portions of this project

Risks

- The microwave networks will not support Gigabit Ethernet services

- Inability to create an acceptable business process for resource sharing

- Difficulty funding the fiber project

- Lack of staff or work group support for the analysis

12.4.4 Fiber Networks

Pinal County and the City of Florence have a few fiber optic networks/cables installed servicing local facilities. Other facilities are served by un-licensed wireless systems. There is potential to connect many facilities with local fiber optic connections that would benefit both the city and the county by eliminating the un-licensed wireless systems and any Qwest-provided circuits. *We recommend that a tactical plan be developed with pricing to construct as many fiber optic connections as possible over the next 10 years.*

- The city and county can develop a plan that would place fiber optic duct in any open trench during construction or repair of water systems, gas systems and sewer systems. Flexible duct such as 1.25" SDR11 at a cost of $0.28 per foot can be purchased in 10,000-foot reels or less in telecom color code, stored in the water department's yard. With the cost of fiber optic cable at an all time low it would benefit the City and the County to pre-purchase fiber optic cable from companies that over purchased during the telecom boom.

- Ordinances can be passed that permit the installation of underground facilities for any vendor if an underground installation or repair is planned. For example, in the City of Steamboat Springs Colorado, they have an ordinance in place to have all utilities underground over time. If the power company needs to replace or upgrade the service, they must place the new service underground and all other service providers can install their service in the same trench.

- All new construction should have a master plan to follow to eliminate multiple trenches and provide for multiple services, which includes fiber optic cable and/or coax cable.

12.4.5 City of Casa Grande

The City of Casa Grande is in a unique position due to the tremendous growth in residential and commercial markets. The City has just completed a franchise agreement with Cox Cable and has

had DSL available from Qwest, as well as new wireless providers offering high-speed internet access.

The city has been implementing new LAN and VoIP services over the past two years and is currently using T-1's for point-to-point access and Internet service. There is a small fiber network in place utilizing multi-mode fiber.

Casa Grande is a critical location for identifying and communicating telecommunications infrastructure development planning due to its rapid growth. The city should work closely with vendors to identify commercial and residential sites that have new or state-of-the-art capabilities so that this information can be communicated to the economic development community and shared broadly along with municipal plans among the developer community.

For example, if a service provider installs fiber connectivity or redundant service lines to a commercial site, it would be to the advantage of both the service provider and the City to share that information with the economic development community and others. Attention to awareness of existing and impending infrastructure development will help improve the coherence of the overall infrastructure in Casa Grande over a period of years. Ideally, public and commercial telecom development should dovetail into an improved market for all players and users. This cannot happen without communication and a shared planning process.

Fiber Networks

The City of Casa Grande has a few fiber optic networks/cables installed servicing local facilities. Other facilities are served by un-licensed wireless systems. There is potential to connect many facilities with local fiber optic connections that would benefit both the city and the county by eliminating the un-licensed wireless systems and any vendor provided circuits. *We recommend that a tactical plan be developed with pricing to construct as many fiber optic connections as possible over the next 10 years.*

- Produce a "Strategic Plan" for new residential and business development focused on the telecommunications infrastructure and publish this "Strategic Plan" for all suppliers, vendors and developers to review before going to plan or permit. In addition, this plan will be available for potential business to review in planning expansions or relocations of their businesses. The "Strategic Plan" should be a 10 year plan.

- Produce a "Tactical Plan" for the development and deployment of new telecommunication services to the area. Included in the Tactical Plan would be the development of a citywide fiber network connecting government, education, healthcare, libraries and law enforcement agencies. Consider the possibilities of extra fiber optic ducts that would be available to the commercial sector in the plan.

- Develop a master plan that would place fiber optic duct in an open trench during construction or repair of water systems, gas systems and sewer systems. Flexible duct such as 1.25" SDR11 at a cost of $0.28 per foot can be purchased in 10,000-foot reels or less in telecom color code and stored in the water department's yard.

- Pass an ordinance to allow the installation of underground facilities for any vendor if an underground installation or repair is planned. For example in the City of Steamboat Springs Colorado, they have an ordinance in place to have all utilities underground over time. If the power company needs to replace or upgrade the service they must place the new service underground and all other service providers are permitted to install their service in the same trench.

- All new construction should have a master plan to follow to eliminate multiple trenches and provide for multiple services.

- Partnering with Pinal County on the SACCNet project and IGA volume purchase agreements is strongly recommended.

- Pressure service providors for ATM services in the Casa Grande service area. Large businesses as well as many government agencies (homeland defense) are migrating to ATM network infrastructures for its Quality of Service (QOS) advantages.

12.4.6 Apache Junction/Gold Canyon Ranch

Apache Junction and Gold Canyon Ranch are close to Qwest central offices in adjacent Maricopa County which have ATM and DSL service. That means that businesses and public entities in these areas can already purchase ATM service by paying for a circuit to the nearest disclosed ATM central office (CO). These communities and their surrounding new developments, need to press Qwest, through participation in the Partnership, to provide more information about the availability and conditions for provision of ATM and DSL service, as well as to identify related services such as inverse-muxed (IMA) multi-megabit bandwidth possibilities via ATM. The Partnership should also address this question to McLeodUSA and other Qwest competitors in this fast-developing region of Pinal County.

12.4.7 Maricopa

Newly incorporated Maricopa (recent population, 5,000) may well give Casa Grande competition for most rapid population growth in Pinal County in the coming decade. Estimates of population growth in Maricopa in the next 10 years range as high as 100,000. In addition to following the general recommendations for all Pinal and Gila County cities and towns (below), Maricopa must consider a local backbone of some sort (perhaps wireless or a short segment of fiber) that would allow the municipality, schools, other public users, and the Ak-Chin reservation to share common access to greater bandwidth through the Partnership link to SACCNet. If a county wireless backbone network eventually has a presence on Sacaton Peak, Maricopa could eventually be added to the county network via a 45 Mbs or higher wireless connection. Ak-Chin mentioned the possibility of building a wireless network to overlay and provide redundancy to its buried fiber network. Perhaps this could become part of a larger wireless strategy for the area.

12.4.8 Stanfield

CAVIT ITV network and Central Arizona College have proposed extending their services to the school district in Stanfield. The Partnership should explore the potential for other public sites in Stanfield to participate in such a connectivity upgrade.

12.4.9 Coolidge/Central Arizona College

Coolidge and nearby Central Arizona College are the center of a wireless ITV network that already serves most of Pinal County and which proposes to add sites to serve all of the county in a recent RUS Distance Learning proposal. Collaboration with the Pinal-Gila Telecommunications Partnership would allow CAC to assemble the critical cash match that would improve its chances of winning another RUS grant award.

The City of Coolidge would benefit from the SACCNet project if the City of Casa Grande and Pinal County develop the Casa Grande – Florence fiber loop or microwave to connect to the SACCNet project. The City is currently acquiring their internet access via a satellite link with Earthlink and is very interested in participating in a potential aggregation plan to SACCNet as well as any potential IGA or volume purchasing plans. The City currently distributes internet access and internal applications across category five cables and single mode fiber.

Also, the Coolidge school district should have multi-megabit connectivity via a connection between its WAN and CAVIT bandwidth that provides its ITV service. The Partnership may be able to supply a means of doing this that is eligible for e-rate support at the district's 90% discount rate. CAVIT, which is legally a school district, may want to consider forming an educational consortium for County bandwidth connectivity, similar to the consortium formed in Graham County. The consortium could then register for a SPIN number and become an e-rate internet access provider, allowing Coolidge schools to contribute its 90% subsidy toward shared bandwidth costs in the County.

Central Arizona College

Central Arizona College is the central asset for the short term development requirements of a county wireless backbone system. Indeed, the existing CAC/CAVIT wireless ITV systems, if bandwidth sharing can be worked out, comprise an almost-complete backbone for the critical Florence - Casa Grande connection necessary for connectivity to SACCNet. CAC's campus has several buildings which are currently used for antenna mounting and others which could be used for antenna mounts, saving considerable costs for construction of new towers for county wireless connectivity.

CAC also reports preliminary discussions with Gila River Reservation construction management officials who want to get access to instructional television resources for heavy equipment operations, safety training, and construction management training. The CAC campus has several points which provide line-of-sight to Sacaton Peak on the Gila River Reservation. A community wireless network presence on Sacaton Peak would benefit both the County network as a whole, and the Gila River Tribe and its independent telco, GRTI. It would also establish a role for collaboration between the reservation, its telco, and the county Partnership.

12.4.10 Gila River Reservation

The Gila River Telecommunications, Inc. has had problems with gaining right-of-way (ROW) access for its infrastructure. GRTI, tribal economic development representatives, and tribal public safety/administration should work with the Partnership and Pinal County Government to examine the possibility of county ordinances which facilitate and permit multiple common ROWs along section lines. This idea, suggested by GRTI technical staff, could be pursued to the benefit of all public and non public parties who may be seeking ROW paths in the counties.

The partnership and Pinal County government should also look at GRTI for its potential in technical employment training to provide the "hands on" skills for advanced network maintenance in both the reservation's and the county's future. The Partnership (and CAC in particular) may be able to help GRTI and the reservation residents get whatever state and federal training and re-training dollars may be available for that purpose. The construction division of Gila River Tribal administration has already approached CAC about delivering construction trades training via an ITV link to Sacaton Mountain on the reservation.

12.4.11 Arizona City

Arizona City successfully campaigned for the extension of ATM service from Qwest shortly after the announcement of Qwest's ATM availability in Casa Grande. This is evidence of Qwest's responsiveness to communities that can make their case and demonstrate demand for new services.

12.4.12 Eloy, Toltec, Picacho

The High School in Eloy has a 54 Mbps microwave connection to the CAVIT ITV network at Central Arizona College. Eloy (in the very near term) might benefit from bandwidth sharing through participation by Eloy City Government and other public offices in the CAVIT network through the Pinal Gila Telecom Partnership process. Toltec and Picacho, nearby, might also be served by extension of the wireless link at Eloy.

12.4.13 Superior

Superior was the town in Pinal County that may have had the most problems with infrastructure due to its position relative to the LATA boundary and its unusual geography. Superior is in something of a depression or bowl that abuts the steep entry of a canyon where Arizona 60 makes its rugged and rocky way toward Miami, Claypool, and Globe.

Superior may have some relief from LATA boundary connection issues due to Qwest winning approval of its 271 application in December, 2003 (allowing Qwest back into the Long Distance market in Arizona). This agreement should reduce in-state long distance charges and Qwest and the supporting studies presented in its application have claimed that it should also reduce data circuit costs and eliminate LATA boundary issues. Communities affected by this change should press Qwest (or have the Pinal-Gila Telecom Partnership do it on their behalf) to identify how connectivity and costs will improve in these formerly disadvantaged areas of both counties.

Qwest also reported recently completing their fiber build into Superior, which could result in improved or upgraded services in Superior. Superior reportedly has no direct line-of-sight to Pinal Peak, so its microwave wireless potential to tie into Telespectra/CAC's microwave network would depend on finding an intermediary "hop" nearby. The Partnership should work with vendors to explore options for linkage to Superior. CAC's recent proposal to the RUS Distance Learning Grant program included bringing ITV service to Superior.

Superior residents should also petition Qwest for DSL service, which is becoming broadly available in other parts of the county.

12.4.14 Kearny, Hayden, Winkelman

Kearney's relatively upscale demography makes a good case for broadband network access. Kearney's geographic position, as with Superior's, makes delivery of network services difficult. CopperNet (http://www.coppernet.net/about/) has made extensive efforts to enhance internet access and bandwidth availability in Kearney, as well as several other towns (Hayden, Winkelman, Dudleyville, Miami, Claypool, Globe) and should be approached about peering with whatever countywide infrastructures are developed by the Pinal Gila Telecommunications Partnership. CopperNet and other small vendors that have made efforts to serve the most rural communities should be resources for middle and last mile infrastructure development sought by the Partnership.

12.4.15 San Manuel, Oracle, Mammoth

CAVIT ITV network and Central Arizona College have proposed extending their services to the school district in San Manuel. The Partnership should explore the potential for other public sites in San Manuel to participate in such a connectivity upgrade. Perhaps there is some way this resource could be shared with Oracle and Mammoth, also, or that San Manuel could model the connectivity to a county backbone for these other communities.

12.5 GILA COUNTY

12.5.1 Payson and Northern Gila County

Payson and other communities above the LATA in Gila County may have some relief from LATA boundary connection issues due to Qwest winning approval of its 271 application in December, 2003 (allowing Qwest back into the Long Distance market in Arizona). This agreement should reduce in-state long distance charges and Qwest and the supporting studies presented in its application have claimed that it should also reduce data circuit costs and eliminate LATA boundary issues. Communities affected by this change should press Qwest (or have the Pinal-Gila Telecom Partnership do it on their behalf) to identify how connectivity and costs will improve in these formerly disadvantaged areas of both counties.

Northern Gila County may also consider issuing an RFI through the Partnership to all vendors seeking creative service solutions for its communities, perhaps as a sub-aggregation of the Partnership.

The Payson area already has extensive network infrastructure in place and may take advantage of participation in the partnership primarily to resolve its "island" status and redundancy issue in the current statewide infrastructure.

12.5.2 The City of Globe/Gila County

The San Carlos Apache Telecommunications Utility (SCATcom) is currently in the process of building a fiber link between its central office in Peridot and Safford, in partnership with Valley Telephone. This will allow SCATcom to have a fiber connection to the Qwest central office in Tucson, eliminating the microwave connection in Globe. SCATcom's General Manager, Vernon James, has expressed interest in serving Globe with a fiber link from Peridot. The City of Globe, Gila County and Qwest could benefit from this potential project. This connection would allow Gila County and the City of Globe to improve their level of network connectivity to the Internet and the State of Arizona Systems in Phoenix, and to participate in the SACCNet project.

12.6 Strategic Action Items

- ✓ We highly recommend the start of discovery meetings with SCATcom to discuss the potential business and service opportunities for the county, the city and SCATcom.
- ✓ Participate with the City Casa Grande and Pinal County in any RFP's, IGA's or volume purchase agreements.
- ✓ Any fiber build out should extend to the downtown Qwest CO in Globe, with a drop at the Globe Unified School District (SD) office. Additional drops could be engineered to facilitate gigabit Ethernet connection for San Carlos schools to the Graham County Education Consortium (in Safford).
- ✓ Due to the high cost of a fiber infrastructure and the low return on investment (ROI), Claypool and Miami are unlikely to be able to participate.
- ✓ Develop a working relationship with Qwest directly. This will enable Qwest to provide engineering support to help Gila County drive the Qwest network towards the specific needs of the county.
- ✓ If Gila County and the City of Globe decide to move forward on their own, it would be wise to look at a potential county-wide RFP effort for telecommunications services.

12.7 CLOSING REMARKS

12.7.1 Network Security and IP Plan

In this report we have recommended sharing resources, volume purchase agreements and IGA's. One important issue to resolve early on in any aggregated shared services agreement, is an agreed upon Security Policy and IP Addressing Plan. With a shared network supporting internet access to both public sector offices and the possibility of local law enforcement offices, a detailed network security plan will be of utmost importance. Network security design, local switching, and better control of IP addressing can provide better performance by "keeping local traffic local" in the network. With these controls in place early on, the potential partners will be more likely to understand the advantages of participating in the aggregated network scenario. These concerns (security, network performance) may already be adequately addressed in the larger context of SACCNet.

The IP plan will be just as important as the network security plan. It will be necessary to distribute and manage IP addresses in an organized format. In fact, if law enforcement participates, there will be a need for two layers of security, a closed network for the law enforcement and an open network for all other public entities. This will require at least two IP address ranges and the ability to manage the plan. Plan to reserve an IP range if there is not an entity with one in hand.

12.7.2 Peering

Peering is a critical performance consideration of regional or statewide WANS.

Peering is the arrangement of traffic exchange between internet service providers. *Private peering* is peering between parties that are bypassing part of the public backbone network through which most internet traffic passes. In a regional area, some ISPs exchange *local peering* arrangements instead of, or in addition to, peering with a backbone ISP. This keeps local traffic local, improving the performance of latency-sensitive applications (such as IP video) and reducing the impact of network traffic slowdowns on local network traffic.

In an aggregated environment, some public entities will be contracted for ISP services other than the potential new aggregator. It may necessary to investigate or require peering arrangements from providers who provide services to a significant number of local network participants.

12.7.3 Engineering

Although the primary concern of infrastructure improvement is access to affordable bandwidth, a close second consideration must be how well a network infrastructure can perform for its users under loads expected from advanced applications such as real-time video conferencing and streaming media.

Both routing and security design will be important design considerations for a wide area infrastructure. Participants must be aware of how their IP addressing and their network access

provider can affect their performance. If and when ATM becomes available in Casa Grande, options for controlling Quality of Service (QOS) will also become attractive choices for organizations that have performance issues. A group purchase agreement with multiple Tier 1 providers will also improve performance stability for WAN users.

12.7.4 Redundancy

Redundancy is an engineering issue, but needs to be discussed separately because it is probably the single factor that becomes most critical as users dependency on high-performance/high bandwidth applications increases. In schools or at health care sites, for example, the ability to provide network-enabled classes or medical care will depend on a reliably performing network connection.

For this reason, any preliminary design and any RFP requirement statement must address the issue of redundancy. A common backbone with some sort of "loop" redundancy (capable of redirecting traffic away from a break in the loop), as well as an insistence on connecting to multiple Tier I internet providers is a critical element for any RFP. As a Homeland Defense issue, public health and safety sites, including government disaster direction centers, should have two separate physical links (or one physical and one wireless; to vendors with separate infrastructure, if possible) from each site. As a matter of good practice, all major telecommunications users should ask vendors about the availability of "fail-over" dual-linked systems that can provide a "self-healing" quality assurance to their network connections.

12.7.5 Request for Proposals (RFPs)

There are many things the Partnership can do with RFPs and common contracting processes to improve the return on investment for all participants in the process.

First, any RFP should require that all existing contracts with the winning vendor be aligned with the new common contract without penalty costs for early termination and without "installation" or "setup" fees. In effect, the new combined contract would cancel all existing contracts and reconfigure them into a single combined contract for a new term. The new contract term will be negotiable, but typically a vendor will want a five year commitment for any commitment to build new infrastructure. This may be enhanced into a five-year contract with annual renewals for an additional five-year period, which would give the appearance of a ten year contract and some comfort to the vendor. The RFP should also state that a resulting contract could be cancelled or renegotiated upon sale of the original contracting vendor.

Second, the Partnership should communicate draft technology plans to a registered bid list of vendors for comment and input before finalizing their plan and proceeding with an RFP. This could be done in the form of a simple letter-form RFI with an attached copy of a summary of the Partnership plan. Vendors will not reveal pricing strategies or proprietary information in response to an RFI, but they may still be able to offer information about their capabilities and near term development that could affect plan outcomes.

Lastly, any RFP should be non-binding on Partnership members, who may choose to participate in a contract which may result. The RFP process itself should also be non-binding on the Partnership, *i.e.*, the RFP does not imply a commitment by the Partnership to any action (only the contract, negotiated point-by-point, can do that).

12.7.6 Externalities

"Externalities" are occurrences or other changes in independent variables within the business, political, and other environments that can affect the viability of a project. These can adversely affect the availability and performance of systems that are not within the control of a customer or aggregated group of customers for a telecommunications infrastructure development project or group purchase project.

"Externalities" also include differences in business or information processes or cultures within potential participant organizations that may impede or prevent operations necessary for a successful aggregation.

An example of "externalities" would be the attraction of availability of funding for new projects by partnering with independent telcos. While independent telcos do not have the financial leverage that large vendors have, they do have access to a number of financial sources (federal subsidies for high-cost services, CoBank funding, etc.) which are not available to other vendors. This makes independent telcos appear in a very positive light as a potential development partner for local or regional projects. However, externalities for independent telcos include their primary business agenda (which may be risk adverse and not allow much room for entrepreneurial development), existing financial commitments/related cash flow, existing infrastructure remediation and maintenance reserve requirements, and their own longer-term development agendas.

A simpler example would be the possibility that school or library districts may not be able to participate due to uncertainties or changes in the Federal E-rate subsidy program.

On a larger scale, there are few vendors that have not been stung by the down turn in the telecommunications industry. Therefore, even when an attractive opportunity presents itself, there may be uncontrolled variables which prevent the vendor from taking advantage of it. A very good and very explicit statement of this cloud of externality which surrounds all future planning by all players in the telecom industry is this postscript that Qwest has taken to appending to its public announcements and press releases:

> [Qwest] **Forward Looking Statement Note [***from a press release dated November 3, 2003: Qwest Offering Voice, Data and Internet Protocol Networking Services to Businesses in 12 Western States for the First Time*]
>
> This release may contain projections and other forward-looking statements that involve risks and uncertainties. These statements may differ materially from actual future events or results. Readers are referred to the documents filed by us with the Securities and Exchange Commission, specifically the most recent reports which identify important risk

factors that could cause actual results to differ from those contained in the forward-looking statements, including but not limited to: unanticipated delays in completing the process of our restatement of historical financial statements and related audits; the duration and extent of the current economic downturn in our 14-state local service area, including its effect on our customers and suppliers; access line losses due to increased competition, including from technology substitution of our access lines with wireless and cable alternatives; the effects of our anticipated restatement of historical financial statements including delays in or restrictions on our ability to access the capital markets or other adverse effects to our business and financial position; our substantial indebtedness, and our inability to complete any efforts to de-lever our balance sheet through asset sales or other transactions; any adverse outcome of the SEC's current investigation into our accounting policies, practices and procedures and certain transactions; any adverse outcome of the current investigation by the U.S. Attorney's office in Denver into certain matters relating to us; adverse results of increased review and scrutiny by Congress, regulatory authorities, media and others (including any internal analyses) of financial reporting issues and practices or otherwise; the failure of our chief executive and chief financial officers to provide certain certifications relating to certain public filings; further delays in making required public filings with the SEC; rapid and significant changes in technology and markets; any adverse developments in commercial disputes or legal proceedings, including any adverse outcome of current or future legal proceedings related to matters that are the subject of governmental investigations, and, to the extent not covered by insurance, if any, our inability to satisfy any resulting obligations from funds available to us, if any; our future ability to provide interLATA services within our 14-state local service area using our proprietary telecom network assets (as opposed to on a switched access basis); potential fluctuations in quarterly results; volatility of our stock price; intense competition in the markets in which we compete including the likelihood of certain of our competitors emerging from bankruptcy court protection or otherwise reorganizing their capital structure and competing effectively against us; changes in demand for our products and services; acceleration of the deployment of advanced new services, such as broadband data, wireless and video services, which could require substantial expenditure of financial and other resources in excess of contemplated levels; higher than anticipated employee levels, capital expenditures and operating expenses; adverse changes in the regulatory or legislative environment affecting our business; and changes in the outcome of future events from the assumed outcome included in our significant accounting policies.

The information contained in this release is a statement of Qwest's present intention, belief or expectation and is based upon, among other things, the existing regulatory environment, industry conditions, market conditions and prices, the economy in general and Qwest's assumptions. Qwest may change its intention, belief or expectation, at any time and without notice, based upon any changes in such factors, in Qwest's assumptions or otherwise. The cautionary statements contained or referred to in this release should be considered in connection with any subsequent written or oral forward-looking statements that Qwest or persons acting on its behalf may issue. This release may include analysts' estimates and other information prepared by third parties for which Qwest assumes no responsibility.

> Qwest undertakes no obligation to review or confirm analysts' expectations or estimates or to release publicly any revisions to any forward-looking statements to reflect events or circumstances after the date hereof or to reflect the occurrence of unanticipated events.
>
> By including any information in this release, Qwest does not necessarily acknowledge that disclosure of such information is required by applicable law or that the information is material.

12.7.7 Caveats

Telecommunications infrastructure development targets growth and usually follows a bit behind growth. A handy goal is to try to work to make development take place simultaneous with growth, if not a bit ahead. Areas with no recent growth, no history of growth, and little prospects of growth will always require some outside assistance (a grant, being in the path of a regional effort, etc.) to see development.

What looks like competition is not always competition, particularly if competition involves buying the same basic infrastructure (on better terms) from a competitive reseller. Keep in mind that this may put the user at one more level removed from diagnostic and repair services in case of failure.

Administrators must be educated about the importance of not purchasing solely on the basis of cost. Lowering costs may not be worth the risks of either business or technical service problems. There are many good reasons for vendor selection other than cost, of which established and responsive vendor relationships are only one (and RFP processes and government purchasing ordinances should allow for this).

Exercise caution and due diligence with respect to vendors or assets that are emerging from bankruptcy proceedings. There may have been maintenance or implementation discontinuities, and the "new" company may also not be very familiar with what they have to offer. While there may be good opportunities to be captured, it is imperative to have a clear understanding of what the risks may be.

Avoid fragmenting services. Ideally, the smaller number of vendors contracted for services (and the most simple business process) the better. An exception is the practice of having two or three providers for redundancy and service continuity purposes. An example would be making certain that the network backbone provided connectivity to multiple Tier I Internet access providers.

12.8 NEXT STEPS

This technology plan suggests a number of possible actions for both the participants and the Pinal Gila Telecommunications Partnership as a whole. The next steps begin with a determination of how the partnership can continue. Specifically:

- Which entities will participate in the continuation of the partnership and on what basis (contributing staff resources to the partnership; active in meetings; willing to work in a task-focused subgroup; interested; group purchase participant, etc.)?
- What legal form may the Partnership or its aggregate members take?
- Will member policies permit participation, aggregation of resources, and group purchasing?
- What will the priorities be of the Partnership in the near and longer term?

The initial task of a continuing Partnership may well be answering the question "Where do these findings 'fit in' with the SACCNet regional plan?" One way to approach continuity would be to plan a two-county conference on the topic, perhaps to be held on Central Arizona College campus. Representatives from SACCNet could be asked to do a presentation on "Lessons Learned" and help the Pinal Gila Telecommunications Partnership identify practices and resources of SACCNet which can be adopted for the infrastructure development needs of Pinal and Gila counties. Such a conference would also provide a context for attendees to discuss and determine priorities and initial efforts for the Partnership. In any event, identifying the players and their tasks, and making sure that the Project does not set out to "re-invent the wheel" in their infrastructure development are the most important next steps.

12.9 DESCRIPTION OF TECHNOLOGIES

The following is a summary of the leading, proven technologies that might be potentially available to bandwidth users in Gila and Pinal Counties.

12.9.1 Wireline (Copper)

Copper wire is the prevailing infrastructure throughout Gila and Pinal Counties with most Qwest central offices served from the main office with fiber infrastructure. There are a few community central offices being served by older microwave systems. Many of the older copper circuits will not support DSL technology that can deliver high-speed broadband circuits over conditioned copper wires due to various reasons.

12.9.2 XDSL

In this technology, the high-speed signal piggybacks on the copper voice line through modulation methods. DSL broadband speeds vary from 128 Kbps up to 10 Mbps depending on

the DSLAM installed, condition of the copper wires and the distance from the local telephone provider's central office. DSL is only available within about 3 cable miles of a Qwest Central Office that has the upgraded DSL software.

DSL comes in various "flavors" that are explained in the DSL Glossary in Appendix M. Because of the relatively high costs to upgrade a Central Office and place DSL terminals in the fields, many Incumbent Local Exchange Carriers ("ILECs") do not offer DSL in less dense rural communities; however, the cost of the "remotes" is beginning to become much more cost effective and can be more easily deployed in "new development communities" today. Currently several companies provide DSL-type services in Gila and Pinal Counties. Qwest has been aggressively deploying DSL in several communities with plans to extend their DSL coverage to several more communities in the next 18 months.

12.9.3 Cable Modems

There are six cable television companies offering cable modem service in Gila and Pinal counties: CableAmerica (Coolidge and Florence); CableOne (Globe, Claypool, Miami); CableVision (Payson, Star Valley); Mediacom (Apache Junction) and Orbital (Rancho El Dorado). Cox Communications will be offering cable modem service to Casa Grande in June 2004. CableAmerica has a fiber optic network that runs from Mesa to Florence. The other cable companies have more locally distributed hybrid fiber/coax backbones.

12.9.4 Fiber Optics

The use of fiber optics creates the highest bandwidth capacity infrastructure possible. This is not to characterize one technology as superior to the others, but to point out that fiber optic cable does not have the limiting factors for increasing bandwidth as other types of transmission methods. All of the above transmission technologies have specific bandwidth limitations. Fiber optic cable capacity can grow as the demand for transmission capacity grows just by changing out the optical lasers on each end of the cable.

The bad news regarding fiber technology is its cost to install and provision service. Typical installation costs range from $15,000 to $25,000 per mile for aerial installations and $25,000 to $70,000 per mile for underground installations. Underground installations of fiber cable are usually made in a trench 48" deep or in a duct system if installed by directional boring.

Many rural communities have opted to install their own fiber network to support the educational and governmental needs and wall as additional fibers and additional ducts for the private sector needs for economic growth. Many of the communities have passed ordinances that mandate this installation of fiber optic duct during and infrastructure rebuild or new installations such as sewer repair or water line upgrade.

12.9.5 Wireless

Wireless options are a viable alternative to deliver high-speed bandwidth in rural Arizona or any market area without the "density" to economically provide service over wireline or fiber optic facilities. However, terrestrially based wireless systems usually rely on "land line" connections back to the Internet (World Wide Web) portal.

A low cost infrastructure alternative compared to fiber optics, wireless microwave may be the lowest cost method to improve transmission capacity in the "local loops" of the more rural areas of Gila and Pinal counties. Wireless "transmitters" or access points act as hubs to collect and transmit signals to users. Most all access points employ line-of-sight technology in order to provide service. Today's new wireless systems operate in the ISM (2.4GHz) unlicensed band and the U-NII (5.3/5.8 GHz) band. The FCC has declared that transmissions in these frequency channels do not require licenses. Access points using this technology typically range from $3,500 to $5,000 each. Subscriber antennas range from $250.00 to $400.00. Many access points can provide coverage from 4 to 8 miles and can support 100 to 500 users.

Data bandwidth capacity delivered by these systems can range from 128 Kbps to 10 Mbps. Weather conditions do not interfere with this technology. This new technology can provide very reliable data transmission services and also currently support voice (VoIP) technology. The cost of these wireless systems is perhaps their most compelling attribute. Many of the towns in Gila and Pinal counties can be provided very high capacity bandwidth services for the cost of one-mile of fiber optic cable installed. It is important to note that, although wireless technologies can increase local loop bandwidth, aggregate bandwidth capacity in and out of the county or towns will still need to be increased.

The latest innovation in wireless technology is the emergence of Wi-Fi "hot spots." These hot spots beam internet connections up to 300 feet making them perfect for local gathering spots like coffee shops, libraries, RV parks, truck stops, laundries, marinas and airports. For example, Starbucks and McDonalds are starting to actively roll out Wi-Fi- access in major metropolitan areas. The speed that can be achieved is limited by the type of broadband connection (DSL, cable, fiber) to the internet. The Rocky Mountain News stated that "According to Gartner's research, the number of public Wi-Fi hot spots in North America is expected to hit 53,479 by 2008."[39] The full article can be found in Appendix G.

12.9.6 Satellite Technology

Two-way broadband Satellite Internet access ("Satellite") offers residential and small office users a high-speed alternative to dial-up in areas where no other alternatives exist. Two-way access is currently provided only by Hughes'

[39] "Freedom to Connect," Rocky Mountain News, January 19, 2004.

Direcway service. EchoStar's Starband product has been discontinued and Echostar (DISH Network) now offers terrestrial internet access through an agreement with Earthlink. While Satellite is a welcome option for users that require high-speed access but are currently unreachable through terrestrial solutions, either wire-line or wireless, the technology does have a number of drawbacks at this stage. Based on opinion and experience of satellite users, the limitations listed below currently make Satellite the technology of last resort for high-speed Internet access.

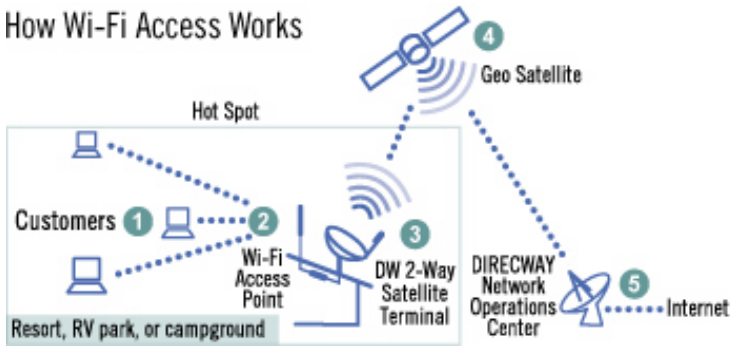
- **Latency.** Perhaps the greatest factor limiting Satellite's adoption and ultimate usefulness is the time it takes an Internet transmission to travel between the end user and the requested web site via the orbiting satellite. The ½ second round trip delay (¼ second each way) means that real time interactive applications such as voice over IP (VOIP) and interactive gaming cannot be supported by Satellite. This deficiency in the technology will only grow more noticeable as increasingly sophisticated interactive applications emerge on the Internet.
- **High equipment and install costs.** Equipment and installation costs $599.99 and includes installation plus the external modem, satellite dish antenna, transmitter and mounting hardware. Install times are advertised at roughly four hours although the process can take significantly longer based on the installer's experience and the user's computer setup. Additionally the 24" x 36" Satellite dish can be obtrusive and may not be allowed in certain communities.
- **Higher monthly fees.** Relative to other high-speed technologies Satellite's monthly costs are high with monthly charges of $59.99 for residential customers. Direcway offers business class services that range from $76 to $190 per month based on the bandwidth needed. It should also be noted customers can choose to use their dish for satellite TV as well (requires separate TV receiver) and beginning costs for both services are approximately $100 per month.
- **Line of sight and snow/rain fade.** For satellite to work, a clear view of the southern sky is necessary. This presents a challenge for users that live in heavily wooded or exceptionally sheltered areas. Additionally heavy snow or rainfall can affect the service with the potential to bring the system to a temporary standstill.

However, even with the many problems and technological limitations facing Satellite Internet, the service is a major improvement over dial-up access. Satellite's major selling points are listed below.

- **Versatile deployment.** Satellite's greatest attribute is its ability to be deployed anywhere with a clear view of the southern sky. Satellite can reach users and remote communities that will never be within range of terrestrial solutions based on location or economics.
- **High speed.** Satellite providers advertise residential download speeds of 500 Kbps (10x that of dial-up and competitive with other terrestrial high-speed solutions) and 150 Kbps upload speeds. Tests from several residential systems show these speeds are consistently met. Direcway's business class services can reach download speeds up to 1000 Kbps.
- **Always on.** Two-way Satellite access is always on. Users can surf the Internet anytime without the need to tie up the phone line. (Direcway offers a less costly one-way system that uses a dial-up connection for upstream requests.)
- **Ability to network.** Satellite connections can be shared among computers in both home and office environments. Of course the more computers on the network the

more bandwidth required, which leads to increased monthly costs. A residential connection can support three-four computers with reasonable speeds.

- **Wi-Fi access.** Satellite is currently offering their service as the "backbone" for Wi-Fi *hot spots* across the United States. They are targeting the leisure industry in places such as resorts, RV parks, campgrounds and truck stops.



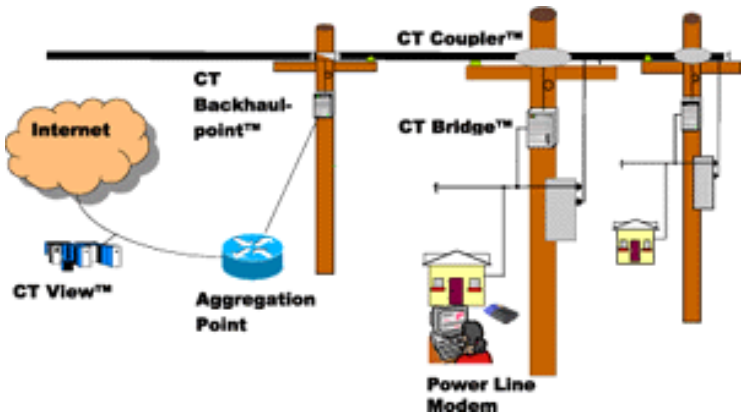
At the end of the day satellite is a good, dependable alternative to dial-up access for heavy Internet users that are unreachable by other high-speed technologies. However, the cost of equipment and higher monthly fees make it prohibitive for many. The latency issue and the inability for Virtual Private Networks (VPN) to work on Satellite, while not major problems at this stage based on the mild demands of current popular Internet applications, will emerge as a major drawback as the Internet's evolution continues. Satellite can be seen as a worthy stop gap technology for many users, both home and business, until terrestrial solutions, often faster and cheaper, are available. More information on Satellite services can be found at **www.directpc.com**. [40]

12.9.7 Power Line Data Transmission

Power line communications (PLC) is a relatively new entrant to telecommunications. The technology uses existing local electric wires to provide digital communication services such as high-speed internet access, voice over IP (VoIP), video and in-home networking in a cost effective last-mile delivery system. All that is needed is for the device (telephone, PC, multimedia) to be plugged into existing electrical outlets.

PLC has been around for a number of years using low data rates (less than 500 Kbps) for remote control of switches, domestic appliance control system, and monitoring systems. The new PLC differs from the old by offering broadband data speeds in the 4-20 Mbps range. This enhanced power line communications system is "piggybacked" on existing low frequency wiring (50-60 Hertz at a low frequency). Below is a diagram of such a system provided by Current Technologies [TM] (www.currenttechnologies.com):

[40] Information from Jack Ferguson, President of I$P Reports (www.ispreports.com) and owner of a two-way satellite system.



Applications of this technology most frequency cited are for in-house and last mile uses. In-house refers to a data path that is typically less than 100 meters between devices, as in a house or building. This has been seen as an attractive, less costly means of retrofitting data services for homes and small offices because no additional wiring is necessary – all devices (PCs, printers, etc) are simply plugged into the existing electrical system.

Last-mile applications refer to the ability to connect the long haul telecommunications plant of the broadband service supplier to the customer. A significant portion of the cost of building a broadband plant is connecting the "backbone" to the final customer. Cable television plants were built primarily to serve the television needs of their customers. Therefore, the bulk of the plant was built in residential areas, not in the business district. Legacy telephone plants have needed massive upgrades for their devices to be able to handle broadband rates. Wireless (WISP) services mostly require line-of-sight to reach their customers. In addition to broadband internet, this PCS system can also provide VoIP, video, surveillance systems, entertainment (gaming) and utilities metering services.

Issues

There are a number of issues that have been raised by the introduction of broadband power line communications systems.

- Compatibility between private and public networks
- Telecommunications policy issues
- Radio-communications interference issues
- Signal to Noise Ratio
- Capacity/Security
- Transformers
- Safety and Procedural

The issue that has gained the most notoriety is that of radio-communications interference. This interference is generated by faults in the wired network such as arcing switch gear, coronal discharge and discharges across dirty insulators, particularly in the high frequency spectrum of 3 to 30 MHz. Users that could be affected include amateur radio, aeronautical and maritime communications ad navigation services, broadcasting, and fixed and land mobile operation.

Concerns have also been expressed regarding possible interference to cable television services and DSL services.

These issues are being addressed by the industry, by the FCC (PLC is subject to Part 15 emission limits) and by State utilities commissions and is defined as:

> *A system, or part of a system, that transmits radio frequency energy by conduction over the electric power lines. A carrier current system can be designed such that the signals are received by conduction directly from connection to the power lines (unintentional radiator) or the signals are received over the air due to radiation of the radio frequency signals from the electric power lines (intentional radiator)*[41].

There is a group in the US called the "HomePlug" power line alliance made up of seven sponsoring companies (including Cogency, Panasonic, Radio Shack and Sharp) and twenty participating members (including Motorola, Philips Electronics, Sony Corp and France Telecom). This alliance has developed a standard specifically for in-house systems and meets the FCC Part 15 requirements (www.homeplug.org).

U.S. Trials

There are ten or more pre-market trials currently in process to test the efficacy of PLC and to prove that interference issues have been overcome. The City of Manassas is currently offering PLC to residential and business customers. The current cost for residential services is $26.95 per month. Business services start at $59.95 for 256Kbps speed and increase to $35.97 per month for 1.5 Mbps speed. Southern Company has partnered with Main.net (www.powerline-plc.com), Ambient (www.ambientcorp.com) and PowerComm Systems (www.powercommsystems.com) and has just completed successful PLC trials within their Georgia Power and Alabama Power territories. PPL Telecom is conducting trials in the Leigh Valley area (Allentown/Bethlehem) of Pennsylvania, PEPCO has partnered with Current Technologies to conduct trials in the DC and Maryland area, and Consolidated Edison of New York is conducting trials using Ambient equipment.

Conclusions

Power line Communications is coming. In fact this technology is already being offered in limited areas of Europe (Finland, Iceland, and Russia) and, in addition to the United States, is being tested in Asia and Latin America. The industry is working through technology issues, regulation issues and worldwide compatibility issues. Commercialization of this technology is expected to gain momentum over the next few years.

[41] *Update on Broadband PowerLine Communications in the Amercas*, United Powerline Council, May 29, 2003

13.0 SUSTAINABILITY PLAN

13.1 SUSTAINABILITY STRATEGIES

The telecommunications activity observed during the survey phase of this study shows that there is an active, developing market for advanced telecommunications services in Gila and Pinal Counties. The market will probably grow adequately in some areas of this region, even if no attention is paid to development of a countywide initiative for enhanced bandwidth services for public and commercial users. However, this will result in uneven development and potentially "leaving behind" major users, such as some County government locations and smaller, more geographically remote communities if the process if left to market forces. A coordinated, regional focus will sustain advanced development and provide a better environment for economic development and quality of life support for the larger community over the course of the next decade.

Since state funding for implementation projects is not currently available and may not be available through other government funding processes, the Gila/Pinal County region as a whole must use this report to discover and capture existing opportunities with respect to:

1. How telecom expenditures are currently being used by the region's stakeholders;
2. Whether these funds can be spent to receive more value both individually and potentially as a region-wide aggregate.
3. If it would be worthwhile to form a group of stakeholders and publish an RFI/RFP (non-binding) to elicit advantageous service pricing or local infrastructure investment from vendors. (At a minimum, the RFP should include the following:
    - Vendor will provide all routers and equipment to connect to network.
    - Vendor presence and job creation in the community.
    - Vendor must offer all services to the community-at-large as well as public offices.
    - County has the capability of accepting portions of responses or rejecting all RFP responses.)
4. If the two-county region could and should form a special district or enterprise fund to capitalize, build and manage an enhanced telecommunications infrastructure?
5. If the two-county region would be better positioned to join the current efforts of the larger regional initiative operating under the umbrella of SACCNet?

This strategy is pragmatic and seeks value through aggregation of current spending and increased awareness of community infrastructure and network access options.

13.2 SUSTAINABILITY RISK FACTORS

Risk:	Strategy:
Lack of technology leadership resulting in limited access to new applications.	Identify and pursue leadership demonstrations - True and lasting development will follow the introduction of new applications. The governance group will have to work with participants to identify which of them will pursue grants, and implementation of new technology demonstrations.
Countywide telecommunications planning does not go beyond "paper" stage.	Hold periodic meetings of stakeholders to report options and ongoing developments in the local telecom infrastructure.
Hardware upgrade costs slow adoption of high-bandwidth connectivity.	Pursue grant funding for public users.
Monthly telecom service costs increase	Educate users about historic trends. The trend is for telecom costs to decrease over time. Costs will more likely decrease or more bandwidth will be available at the same cost.
Failure to engage participation by remote sites due to service limitations and high costs.	Activism - Multiple strategies, including public investment in infrastructure outreach, may be required to extend equitable service access to sites such as Superior, Hayden, Winkelman, and others. Mutual benefit of development - governance group should maintain a continuing and friendly dialog with all vendors, targeted at assisting them in business development and feasibility requirements for service to remote sites.
Some public agencies/non-profits do not have a budget for investment in LANs, new routers, or baseline PCs to be able to connect to an enhanced network.	Upgrades should be addressed in the aggregate in future budget projections, not by individual department or agency. Collectively, all stakeholders should arrange group purchase agreements for standardized equipment.
Agencies included in the RFP might not sign long-term service contracts.	Clear communication of commitments, along with use agreements by all agencies prior to issuance of the RFP will be needed so that RFP bidders can more accurately price their

	bids. Most agencies to date have indicated a willingness to enter into long-term contracts for improved services.
Economic development risks.	Economic development risks will be very high should the two counties ***not*** improve telecommunications services. We can associate no economic development risks with improving telecommunications services in the region.
Financial risks that there will not be adequate aggregated demand for a provider to either upgrade the existing system or for a new provider to enter the market.	These financial risks to the counties will be addressed by making sure the improvements requested will be affordable to the targeted user group. New infrastructure providers will face a greater risk than the incumbent but technology, like wireless networking, may lower capital and operational costs.
Political risks for incumbents.	Spending on telecommunications technology in light of other priorities may be politically risky during the current downturn in the economy. However, failing to invest in an opportunity to ensure economic growth is also risky.
Operational risks of implementing the network.	Operational risks can be addressed through the RFP process and working with the telecommunications providers serving the region. Operational risks can be reduced by requiring higher service standards and advanced telecommunications services as part of the improvements made to telecommunications infrastructure.

The biggest risk is that not many of the public stakeholder entities will actually contract for services and thus cause the successful RFP bidder to either raise prices or withdraw from the area. Since the bandwidth requested is minimally more expensive than what is being paid now we do not believe the above scenario will occur.

It is possible that some entities might decide to stay with their existing providers. However, we believe that other public offices and the private sector growth will more than offset those who choose not to buy services, especially when the benefits and applications aggregate access to high-speed bandwidth become commonly known throughout the community.

13.3 STRATEGIES FOR SUSTAINABILITY RISK MANAGEMENT

Strategies for making sure the above referenced growth will occur will be in the form of targeted business development activities. Although many residents express concern about rampant, quality-of-life-changing growth, most persons we contacted agreed that the communities and the Counties will need to attract additional businesses, broaden the tax base and plan for that growth.

Providing shared network connectivity for all the health care offices serving and surrounding the Casa Grande, Cobre Valley and Payson Regional Medical Centers is an example of long term planning for economic development. This would facilitate the development of office- and facility-based telehealth services, increase productivity (if it can reduce the need for patients and physicians to travel across the county, across town, or even, across the street to the Hospital for services or consultations), and improve the business capabilities (such as staff training and online billing) of all hospital-area healthcare providers. Planning and providing for advanced connectivity for the rapidly growing residential areas of Gila and Pinal Counties, areas like Arizona City, Maricopa and Star Valley, provides an inducement for the location of technology-driven clean industries.

Finally, a critical long-term sustainability strategy must include exploration of the establishment of a state-wide, coordinated broadband backbone that ensures generalized access to technology without respect to distance, density or terrain factors. While this is a project that logically cannot be done from the regional perspective, Gila and Pinal Counties, along with its neighboring counties and others interested in obtaining low-cost, high speed, reliable broadband service access, have an interest in seeing such a network developed. Access to a state-wide broadband network would provide a more cost-effective network connection for public users who can singly or in some form of consortial arrangement take advantage of participation in a county or regionally-operated infrastructure network, or individually contract for multi-megabit connectivity. Ideally, however, incremental improvements in network connectivity should be done in such a way to benefit both commercial and public users of the enhanced broadband network resource.

14.0 GRANTS AND LOANS

14.1 Introduction

This section of the CTA report provides suggested strategies for leveraging grant dollars and other funds for telecommunications and telecommunications related projects. It includes information on four different types of grants – federal formula grants and subsidy programs, federal discretionary (competitive) grants, state grants, and private foundation and corporate grants – as well as loans that are available for telecommunications and telecommunications related assistance. It also includes information on other potential financing mechanisms and resources for conducting additional research on State and Federal grant and loan opportunities and private foundation grant-making programs.

The Current Grant Climate*:* The golden days for grant funding of telecommunications infrastructure were the early '90s when the internet was new and its heyday began. Along the way, the concept of a *digital divide* emerged, and this gap between haves and have-nots, rich and poor, urban and rural, continued to fuel grant program availability and program targets. The durable problems of *last mile* connectivity and *backhaul* charges, and the extreme geographies and low population densities of west-of-the-Mississippi states (where there are many counties with less than three persons per square mile) also gained attention and generated funding opportunities. But the dot.com boom went bust, the telecom industry declined, government revenues constricted, and private foundations moved on to other priorities. The bloom is off the internet and all current funding sources now cast a cold and judicious eye on telecom projects, just as private financial sources do. The opportunities are still there, but the pie is smaller, proposals have to be more original, they have to clearly convey the end use and broad community benefits, and they have to have strong business plan-like cases for sustainability. It is no longer enough to request funds for telecommunications development; you now have to be able to demonstrate how you will use the bandwidth to achieve desired community outcomes such as health and well being, public safety, educational excellence, economic development and so on.

What Funding Sources Are Looking For: Most sources of funding are competitive, so proposals need some originality of concept, innovative process, or remarkable organizational collaboration to stand out as a viable candidate for funding. Here's what funding sources are looking for recently:

- A definite (and preferably new appropriation) cash match - some grants require a 1:1 match, others only require a 15-20% match, and a few require no match.
- Demonstrated experience and capacity (by the vendor or proposing organization) with previous technology projects;
- In-kind match should be tangible (a donated router, for example);
- A genuine and credible "business" plan for sustainability past the expenditure of sought funds;
- Collaborations and partnerships with the prospect of improved community aggregation and resource sharing as an outcome;

- Vendor participation, preferably as a capital investment to match to community-generated funds;
- Diversity of applications and users with broad community benefits;
- Economic development impact;
- Filling gaps that will not be filled by commercial providers.

What they are not looking for: The days of gee-whiz technology demonstrations are over. Industry standard technologies -- advanced, if possible -- are favored, and extreme technologies (such as satellite) are tolerated only as a worst-case resort. Grants will not likely fund technology projects that do not clearly convey how the technology will be utilized and how this use will result in positive "big picture" outcomes for the community and region. Also, funding sources are not interested in funding operational expenses -- all investment sought should go to specific project components such as infrastructure and hardware. Note that when a grant request fails, many grantors will share evaluation information with proposal writers so that they can learn what evaluation teams liked and did not like about a specific proposal. Over time, this information can be used to sharpen the writing of grant requests and become successful.

14.2 Suggested Grant and Loan Strategy

Telecommunications projects are large, often complex projects which require sophisticated resource development through many mechanisms. This complexity and size dictates a fund development strategy which investigates and utilizes several sources of capital simultaneously. As such, the suggested grant and loan strategy has several components, as outlined below.

14.2.1 Seek to develop effective collaborations and partnerships

The outlook for grant funding sufficient to support wide area infrastructure development has never been bright. However, developing strong collaborations and partnerships, especially new "model" collaborations and partnerships, can be an important first step in developing a successful grant campaign. Many of the resources discussed in this document are being or have already been pursued by constituent organizations in Pinal and Gila Counties. There may be advantages in examining the potential of new partnerships or consortial arrangements within or between the counties to seek some of these grant or subsidy opportunities in larger aggregations. This is something that may appeal to some funders, such as the TOP program of the Federal Department of Commerce and the USDA's community broadband grant program.

Telephone companies as partners: Although small independent telephone companies are often regarded as quaint holdovers from the historic period of rural electrification, they are typically more progressive and entrepreneurial than large vendors and have greater personal investment and institutional history with the community than any other potential provider. Pinal and Gila Counties should seek any working collaboration with independent phone companies serving its communities (Gila River Telecommunications, Inc., and San Carlos Apache Telecommunications Utility, Inc.). If possible, both counties may want to consider pursuing grant and loan development projects with them for infrastructure projects that extend their service areas.

Cable companies as partners: Community cable system operators can contribute to community technology infrastructure in several ways. Perhaps the most traditional of these is the access trade-offs many cable systems make as part of the contracting of their franchise agreement, often including donations of access to local schools and libraries, or providing service to a local government television channel. Unfortunately, most franchise agreements were negotiated well before cable systems became a player in the internet access marketplace, and local government officials are often not aware of network access infrastructure possibilities and do not include future access development considerations when franchise renewals are negotiated. In addition to system access, many cable systems have well-defined community relations programs which typically provide small grants to community organizations, not limited to donations of service or technology-related programs.

Examples of creative partnerships which resulted in funding from the TOP program include "Technology for All," a Houston fiber-optic network project linking local community technology centers which was proposed as a jobs creation program with community economic development benefits. The project established a broadband, fiber optic network between local community technology centers with the objective of creating sustainable employment opportunities for low-income Houston residents. The proposal justified the development of a community fiber optic network that then could have other development or public service uses.

The *Technology For All* (TFA) project was the result of a partnership between the Houston's Mission Milby CTC; two CTCs in The Heights CommuniPOP; the East Side Village Community Learning Center in Houston's Third Ward; Dimension 4, a document conversion company; the Houston Area Technology Advancement Center; the Telecom Opportunity Institute; Houston's STREET U workforce development initiative; the Local Initiatives Support Corporation; Decision Information Resources; and several supportive organizations including the University of Houston College of Technology, LULAC National Educational Service Center, Houston Independent School District and Houston Community College. Community participants include the school district, a university and community college. The project both created an annual estimated payroll of $1 million with an economic impact of over $4 million and created income to sustain the project. For more information on this creative partnership and project: http://ntiaotiant2.ntia.doc.gov/top/awards/details.cfm?oeam=486003012

Another example of a broad partnership is in Northwest Colorado where three counties, five municipalities, two hospitals, six libraries, and six school districts worked together to leverage Community Development Block Grant funding, as well as grant funding from the State of Colorado, to develop telecommunications capacity in the region. In addition to leveraging $1.675 million in grant funds (plus substantial additional e-rate funds), the partners aggregated all of their services with one vendor, and in doing so, were able to negotiate a contract which resulted in additional fiber infrastructure, new DSL capacity, and elimination of backhaul charges, all at favorable rates. The vendor was able to take the contract (which served as a guarantee of business and market size) to a utility funding source to secure substantial loan funding at favorable rates. This funding launched the company's infrastructure development and services in the region. The introduction of infrastructure "proved" the market case and competition in each of the previously unserved markets developed with positive outcomes for the region - the partner

entities and the general public ended up with better infrastructure, more services, more options, and better pricing. In addition, each partner entity continued to pursue grant funds for their specific needs, such as digital government for municipalities, video arraignment for public safety, or telemedicine for the hospitals.

14.2.2 Develop new or increased grant writing activity and grant capacity in the region

Developing new or increased grant capacity and grant writing activity in the region can take many forms. At its most basic level, this would include each organization supporting the grant seeking efforts by other organizations for projects that will have related benefits for sites in the region. This can include providing letters of support, technical assistance on project development, grant writing assistance, participating in components of the project, or providing in-kind services or cash match (even a token match) to the project.

Another method of increasing regional grant capacity is to consider coordinating grant activities and to aggregate similar grant projects into a larger entity that would pursue the same resources. Most stakeholders are actively pursuing grant support for their technology development. As such, they may resist considering aggregation into a larger entity that would pursue the same resources. The best course of action in the near term would be to convene a meeting of grant-seeking organizations and their skilled grant writers to discuss strategies that would allow some form of two-tiered activity that would support maximum participation in an aggregate grant project, while protecting their own grant seeking behavior from favored sources. Such a meeting would also facilitate the development of shared goals for wide area infrastructure development.

Persisting in grant-seeking over a period of years, meeting with potential funding sources, and developing solid relationships with funders are all important capacity building steps. Finally, leveraging grant dollars successfully requires not only developing a solid project that meets funding criteria, but also researching grant sources and criteria, developing a competitive grant application and proposal, managing the project and grant, and conducting all grant reporting. When several grants are procured for the same project, the complexity increases in terms of financial management of each of the grants. An important component of grant capacity building would include developing and sharing on a regional basis, knowledge, capacity and expertise in each of these areas.

14.2.3 Identify discrete smaller projects within the larger vision and project

A first step for Pinal/Gila Counties in pursuing grant and other funding sources is to identify elements of the infrastructure plan which can be targeted for grant or loan funded investment as a discrete project that is a component of the overall vision. Segmenting the large visionary project into smaller fundable components is a bit like developing a jigsaw puzzle. Each piece needs to be a discrete stand alone piece which can be funded by an appropriate source, while simultaneously feeding into the larger project. There are very few funding sources that will be focused on funding the entire project, however many funding sources could be interested in different smaller aspects of the project. Segmenting a project into smaller components allows the collaboration or a single entity in the collaboration to seek funding for a particular project element from a funding

source that is a good fit for that element, but not for the entire project. Once the overall vision and subcomponent projects have been identified, all stakeholders who could benefit from the proposed infrastructure development should collectively pursue multiple funding sources to support the proposed development.

14.2.4 Phase Projects

Most grant and loan funds require a discrete project period, which is typically anywhere from 12 months to 2 years. Dividing a large, multi-year project into smaller phases will not only enable you to leverage multiple grants from the same funding entity (for phase I, phase II, etc.), but also it will assist in meeting funding period requirements.

14.2.5 Maximize the use of formula grants and subsidies

The lowest hanging fruit in the grant world are formula grant programs and subsidies. These grant programs are open to any entity who meets the eligibility criteria. There is paperwork associated with getting these funds; however the process is guaranteed and the funds can contribute to the overall project. For example, not every e-rate eligible entity is applying for the e-rate subsidy. Full utilization of e-rate would increase the level of demand for services, making the market more desirable. Provision of these services could be aggregated to support the overall vision. More information on opportunities can be found in the Federal Subsidies section.

First – seek grant funds from funding sources interested in fostering development of broadband communications. There are a few programs which fund telecommunications directly. These programs will be the most direct method of securing funding for different phases of the overall project and should be thoroughly investigated, and contact made with program personnel. Direct funding programs include the USDA community broadband grant program and the Department of Commerce's Technology Opportunities Program. Both of these funding sources are competitive, so having a strong partnership, clear outcomes, and project sustainability is critical. More information on broadband grant programs will be found in the section on Federal Grant and Loan opportunities.

Second - seek grant funds from technology friendly funding sources interested in related goals: There are several funding sources which, while not interested in funding telecommunications for telecommunications sake, will provide funding for telecommunications services and equipment if the overall outcome of the project leads to their desired outcomes. Examples of this are the US Department of Agriculture's Telemedicine program and the Department of Homeland Security's focus on communications. When applying for these grant funds, it is critical that you be clear in how the telecommunications infrastructure will be used once it is funded and developed, and that you sell the end use and outcomes for the particular subject area (telemedicine, health, public safety communications, etc.) while making the case for telecommunications as a necessary step. More information on related grant programs will be found in the section on Federal Grant and Loan opportunities and State Grant Opportunities.

14.2.6 Pursue loans and other financing mechanisms where appropriate

Not all components of the project will be a good fit for funding by grants or subsidies. Luckily, the federal government has several very helpful loan programs which seek to support infrastructure development projects through loan and loan guarantee programs such as the US Department of Agriculture's Broadband Loan Program through the Rural Utility Service. These, and other federal program loans, are substantially cheaper than commercially available credit. The eligibility issue for these loans is the ability to generate a sufficient revenue stream to repay the loan made to a private business, either not for profit or profit. For a private company to accept debt to improve infrastructure, it is likely local communities would have to shelter some of the risk through a revenue stream guarantee of some form. A consortium of municipalities, county, and school districts might consider sharing the risk among multiple agencies to enhance the overall community. More information on sources of loans can be found in the section on Federal Grant and Loan Opportunities.

In addition to loans, there are many financing options which are available to local governments. There are many State programs and agencies which provide technical assistance and support to local units of government seeking to develop new tax or bond funding for a community infrastructure project. These organizations, such as the Greater Arizona Development Authority, could be significant resources in any effort to develop new tax or bond funding for telecommunications infrastructure. Finally, Arizona State is in the process of developing Venture Capital funding to support entrepreneurial projects and new business development. Should this effort be realized, this could be a potential source of capital for a large project. More information can be found in the section on Other Financing Options.

14.3 Federal Formula Grant and Subsidy Programs

14.3.1 Federal E-Rate Subsidy to Schools and Libraries

The most stable ongoing source of telecommunications support funding is the Federal e-rate program, which has provided an average of $46 million in telecommunications, internet access, and internal connection subsidies to Arizona schools and libraries annually from 1998 to 2002. In Pinal and Gila Counties e-rate subsidies average 70% and half or more of all e-rate subsidy dollars go to support "Internal Connections" (*i.e.*, internal wiring and customer premises equipment such as routers and LAN equipment) in schools that are at the 80% or greater discount level. E-rate does not fund public infrastructure and places careful limits on school or library WAN subsidy possibilities.

Recent attention to reducing fraud and waste in the e-rate program has resulted in significant changes to the program that will have their greatest effect on the poorest and most rural schools, beginning in program year 2005. Beginning in that year, schools that had been able to apply for internal connectivity funding (which typically accounts for half of the subsidy amount received) on an annual basis will be limited to applying only two years out of five and there will be new restrictions on maintenance funding:

Upgrading or replacing Internal Connections.
Applicants can receive funding for internal connections no more than twice every five funding years. This rule will become effective beginning with support received in Funding Year 2005. So, after the current application cycle (Year 2004), during any 5 year period, eligible participants can only apply for internal connections twice. However, application doesn't mean a guarantee of funding. The funding caps will still apply. So, if an organization applies twice in a five-year period and is at the 81% discount level both of those years and SLD cuts off funding at 83%, they still won't receive funding for internal connections.

Basic maintenance on Internal Connections
Maintenance requests will continue to be funded as internal connections but won't be subject to the twice-every-five years funding rule. Participants will be able to apply for maintenance every year. But, again, the funding caps will remain in place. This rule will become effective immediately. Because of waste, fraud, and abuse, the FCC has clarified basic maintenance costs for internal connections. SLD will approve basic maintenance if the maintenance is necessary for the connection to function and serve its intended purpose with the degree of reliability that non-school customers would receive. Basic maintenance services do not include services that maintain equipment that is not supported or that enhance the utility of equipment beyond the transport of information, or diagnostic services in excess of those necessary to maintain the equipment's ability to transport information.

For example, basic maintenance will include repair and upkeep of previously purchased eligible hardware, wire and cable maintenance, and basic technical support, including configuration changes. On-site technical support is not necessary to the operation of the internal connection network when off-site technical support can provide basic maintenance on an as-needed basis. Services such as 24-hour network monitoring and management also do not constitute basic maintenance. Such services are therefore ineligible for discounts under the schools and libraries universal service mechanism.

Technical support, including on-site Help Desks, is not eligible under the FCC's rules if it provides any ineligible features or functions. If a technical support contract provides more than basic maintenance, it will be ineligible for discounts.

The crack-down on fraud and waste has also resulted in several indictments and a Congressional investigation which is expected to begin hearings early in 2004. At least one Arizona vendor has received a letter from House Energy and Commerce Committee Chairman Billy Tauzin (R-LA) and Oversight and Investigations Subcommittee Chairman James Greenwood (R-PA) requesting detailed responses to a series of questions about how they conduct their e-rate business. http://energycommerce.house.gov/108/News/07142003_1028.htm

Calling e-rate a "hidden tax," U.S. Congressman Tom Tancredo (R-CO) reintroduced legislation (H.R. 1252) in the 108th Congress (2003) that would terminate the e-rate program of the Federal Communications Commission (FCC) to impose a mandate on telecommunications providers that

supply information technology services for schools and libraries at a discounted rate. Rep. Tancredo originally introduced the bill in the 106th Congress. Although Tancredo's bill has never made it out of committee, several indictments arising out of the fraud and waste investigation and the upcoming Congressional hearings make it likely that significant changes to the program may occur when the program's future is considered again in Congress.

E-rate average annual funding commitment for the State of Arizona 1998-2002 was $45,999,675.26. E-rate funding commitments for schools and libraries in Pinal and Gila Counties in program year 2002 (the last complete program year) totaled $1.375 million for internet access and telecom services. Another $3.685 million was committed for Internal Connections funding in Pinal and Gila Counties. With the upcoming changes in how internal connections funding is made available, both counties are likely to see reductions in Internal Connectivity funding support. There may also be some redistribution of Internal Connections funding opportunities to schools which previously could not qualify due to the program's restriction (determined by funding availability) to schools with discount rates of 80% or higher.

As described on its website (http://www.sl.universalservice.org/), E-rate is:

> *The E-rate - or, more precisely, the Schools and Libraries Universal Service Support Mechanism - provides discounts to assist most schools and libraries in the United States to obtain affordable tele-communications and Internet access. Three service categories are funded: Telecommunications Services, Internet Access, and Internal Connections. Discounts range from 20% to 90% of the costs of eligible services, depending on the level of poverty and the urban/rural status of the population served. Eligible schools, school districts and libraries may apply individually or as part of a consortium.*
>
> *The E-rate supports connectivity - the conduit or pipeline for communications using telecommunications services and/or the Internet. The school or library is responsible for providing additional resources such as the end-user equipment (computers, telephones, and the like), software, professional development, and the other elements that are necessary to realize the objectives of that connectivity.*
>
> *The E-rate is one of four support mechanisms funded through a Universal Service fee charged to companies that provide interstate and/or international telecommunications services. The Universal Service Administrative Company (USAC) administers the Universal Service Fund at the direction of the Federal Communications Commission (FCC); USAC's Schools and Libraries Division (SLD) administers the E-rate.*

In many rural communities the school is the only high-bandwidth network connection, and in extreme cases, as in the wilds of Alaska, these school connections have even been shared community wide. It is important for smaller communities to consider the aggregate effect of e-rate subsidized network connectivity upgrades by school districts and the possibility of shared connectivity (between the municipality and the school, for example). Grantors of all kinds have taken to looking favorably on shared-use connectivity, so a consortium or shared access model based on the local school's e-rate subsidy is a possibility which should be considered in smaller communities.

See "Cost Allocation Guidelines for Consortia Comprising Eligible and Ineligible Entities" on the SLD website at http://www.sl.universalservice.org/reference/costaloc.asp

There is always some talk of ending the e-rate program, but such subsidies are hard to kill and the telecommunications industry now depends on them for rural services in many areas. It may, however, eventually be distributed differently, as a block grant to states administered by the state department of education, for example.

The Universal Service organization also administers a subsidy program for health care facilities funded by the same mechanism.

14.3.2 Rural Health Care (RHC) Universal Service

The Rural Health Care Division of USAC (http://www.rhc.universalservice.org/) is responsible for ensuring that health care providers in rural areas obtain the benefits of current telecommunications technology as provided for by the United States Congress and the Federal Communications Commission (FCC) through universal service support. The FCC established a program that will fund up to $400 million annually so that rural health care providers pay no more than their urban counterparts pay for the same or similar telecommunication services

The Rural Health Care subsidy program is not a first-dollar subsidy program, as is the e-rate program for schools and libraries. Instead, it provides a subsidy for the high cost elements of rural service by comparing the rural costs to costs in a nearby urban area, and then subsidizing the difference, effectively equalizing the price of telecom service for health care providers in urban and rural settings. The Rural Health Care Support Mechanism calculates support using one of two methods: using only a mileage-based calculation, or by comparing the differences between urban and rural rates. Applicants may choose the method based on which is easier, or which provides the most support, according to their own circumstances. Those who choose urban/rural rate comparison will receive support equal to the difference between what they pay (the rural rate) and what they would pay if they were receiving the service in the nearest large city of 50,000 or more (the urban rate).
http://www.rhc.universalservice.org/applicants/abouturban.asp

USAC funding commitments for Rural Health Care Universal service in Arizona have varied in recent years:

2003 Arizona Commitments Total = $ 63,651 (commitments YTD 6/2003-6/2004)
2002 Arizona Commitments Total = $1,179,985
2001 Arizona Commitments Total = $ 672,747

2003: So far, in RHC program year 2003, RHC commitments for telecom support for health care providers in Pinal and Gila Counties totals $8,888, although this only counts the commitment for San Carlos Hospital. There are nine other applicant sites for RHC program year 2003 funding:

Applied for 2003 support:	
Payson Regional Medical Center	Payson
Sun Life Family Health Center	San Manuel
Sun Life Family Health Center	Coolidge
Cobre Valley Community Hospital	Claypool
HU HU KAM Memorial Hospital	Sacaton
Horizon Human Services	Globe
Rim Guidance Center-Payson	Payson
San Pedro Valley Behavioral Health-Oracle	Oracle
San Pedro Valley Behavioral Health-Kearny	Kearny

2002: In RHC program year 2002, RHC commitments for telecom support for health care providers in Pinal and Gila Counties totaled $64,924. The following sites received RHC funding commitments:

Horizon Human Services	Globe	$ 444
HU HU KAM Memorial Hospital	Sacaton	$ 3,806
Payson Regional Medical Center	Payson	$ 9,396
Rim Guidance Center-Payson	Payson	$ 2,829
San Carlos Hospital	San Carlos	$11,737
San Pedro Valley Behavioral Health	Kearny	$ 2,815
San Pedro Valley Behavioral Health	Oracle	$ 819
Sun Life Family Health Center	Coolidge	$ 407
Sun Life Family Health Center	San Manuel	$ 1,948

14.4 Federal Grant and Loan Opportunities

The following federal departments and agencies provide grant and or loan funding for telecommunications and telecommunications related projects. Some of the information presented is based on FY2003 and FY 2004 programs whose application deadlines have passed, but whose programs are expected to continue. If a particular grant opportunity fits your need, remember to sign up for electronic program reminders through the Grants.gov system. (More information on this follows in the Federal Grant Program Information and Resources section.) Also, please note that some of these federal programs are administered through Arizona state agencies and administrative offices.

DUNS Numbers: Having a DUNS number is a new requirement for all federal grant applications as of October 1, 2003. The Office of Management and Budget (OMB) issued a directive to implement the requirement for grant applicants to provide a Dun and Bradstreet (D&B) Data Universal Numbering System (DUNS) number. The DUNS number supplements other identifiers required by statute or regulation, such as tax identification numbers. You can request and register for a DUNS number by calling 1-866-705-5711

14.4.1 Federal Department of Agriculture (USDA)

A good federal source of funding for telecommunications is the Federal Department of Agriculture through several programs:

Rural Utilities Service (RUS): Community Connect Broadband Grant Program
This program was a pilot grant program for the provision of broadband transmission service in rural America. The program has not yet been refunded, however if funding is authorized, this will be a good source of funds for broadband. In fiscal year 2002, $20 million in grants were made available through a national competition to applicants proposing to provide broadband transmission service on a "community-oriented connectivity" basis. The "community-oriented connectivity" approach targeted rural, economically-challenged communities and offered a means for the deployment of broadband transmission services to rural schools, libraries, education centers, health care providers, law enforcement agencies, public safety organizations as well as residents and businesses. The all-encompassing connectivity concept was designed to give small, rural communities a chance to benefit from the advanced technologies that are necessary to foster economic growth, provide quality education and health care opportunities, and increase and enhance public safety efforts.

Rural Utilities Service (RUS): Broadband Loan and Loan Guarantee Program
In FY2003, this program provided $1.4 billion in loans and loan guarantees to provide broadband services in rural communities where the population was 20,000 or less. The loans are intended to facilitate deployment of new and innovative technologies to provide two-way data transmission of 200 kbps or more, in communities with populations up to 20,000.
http://www.usda.gov/rus/telecom/broadband.htm

Rural Utilities Service (RUS): Distance Learning and Telemedicine Grants
This program provides grants, loans, and grant/loan combinations to rural entities for distance learning and telemedicine. Funds can be utilized for equipment, computer networks, programming, technical assistance and instruction.
http://www.usda.gov/rus/telecom/dlt/dlt.htm

Rural Utilities Service (RUS): Dial-Up Internet Program
The Local Dial-Up Internet Grant Program is designed to provide financing to furnish, in rural areas, local dial-up internet access where it does not currently exist. Grant funds may be utilized for the acquisition, construction, and installation of equipment, facilities and systems. Grants are awarded, on a competitive basis, to entities serving communities of up to 20,000 inhabitants to ensure rural consumers enjoy the same quality and range of telecommunications service as are available in urban and suburban communities.
http://www.usda.gov/rus/telecom/initiatives/index_initiatives.htm#dialup

Rural Utilities Service (RUS): Rural Telephone Bank
The Rural Telephone Bank was established in 1971 as a source of supplemental financing for telecommunications companies and cooperatives eligible to borrow under the RE Act's telephone loan program. The Rural Telephone Bank, in partnership with RUS, provides rural

telecommunications companies with financing for the improvement and expansion of telecommunications service in rural areas.
http://www.usda.gov/rus/telecom/rtb/index_rtb.htm

Rural Business-Cooperative Service: Rural Business Enterprise Grant
This program gives grant funds to public bodies, private nonprofit corporations, and Federally-recognized Indian Tribal groups to finance and facilitate development of small and emerging private business enterprises located in any area other than a city or town that has a population of greater than 50,000 inhabitants and the urbanized area contiguous and adjacent to such a city or town. The public bodies, private nonprofit corporations and federally recognized Indian tribes receive the grant to assist a business. Grant funds do not go directly to the business. Funds are used for the financing or development of a small and emerging business. Eligible uses are: Technical Assistance (providing assistance for marketing studies, feasibility studies, business plans, training etc.) to small and emerging businesses; purchasing machinery and equipment to lease to a small and emerging business; creating a revolving loan fund (providing partial funding as a loan to a small and emerging business for the purchase of equipment, working capital, or real estate); or construct a building for a business incubator for small and emerging businesses.

Rural Development Program: Rural Economic Development Loans

This program provides zero-interest loans to electric and telephone utilities financed by the Rural Utilities Service (RUS), an agency of the United States Department of Agriculture, to promote sustainable rural economic development and job creation projects. The utility is required to re-lend, at zero-percent interest, the loan proceeds to an eligible "third-party recipient" for the purpose of financing job creation projects and sustainable economic development within rural areas. A rural area is any area of the United States not included within the boundaries of any urban area, as defined by the Bureau of the Census.
http://www.rurdev.usda.gov/rbs/busp/redl.htm

Rural Development Program: Rural Economic Development Grants
Provides grant funds to electric and telephone utilities financed by the Rural Utilities Service (RUS), an agency of the United States Department of Agriculture, to promote sustainable rural economic development and job creation projects through the operation of a revolving loan fund program. The utility is required to operate and administer a revolving loan fund program using the grant proceeds. The utility can then make zero interest loans to nonprofit entities or public bodies for educational facilities, community facilities, medical facilities, community development projects and business incubators.
http://www.rurdev.usda.gov/rbs/busp/redg.htm

14.4.2 Federal Communications Commission: Tribal Land Bidding Credits

The FCC provides bidding credits to telecommunication carriers to help offset some of the costs of providing telecommunication services on tribal lands. The program was developed to assist people living on tribal land to acquire telecommunications services through overcoming some of the financial hurdles posed by bringing telecommunications services to sparsely populated, remote areas. http://wireless.fcc.gov/auctions/tribal

14.4.3 US Department of Commerce, National Telecommunications and Information Administration Technology Opportunities Program (TOP)

The Technology Opportunities Program, formerly known as the Telecommunications and Information Infrastructure Assistance Program, is a highly competitive, merit based grant program that funds innovative technologies, including practical applications of new telecommunications and information technologies. TOP makes grants to state, local, and tribal governments, health care providers, schools libraries, police departments, and community based nonprofit organizations. It currently disburses approximately $12-14 million per year. Funded projects are model projects which promote widespread availability and use of digital network technologies in the public and non-profit sectors and which demonstrate new or innovative use of technology to meet a community need for services or opportunities. Funded projects typically have an application or programmatic basis, which any proposed infrastructure development serves to facilitate.

The TOPs grant program is unusually competitive. It its most recent cycle, it awarded 28 grants from a submission pool of 569 applications (5%). A list of awardees, with links to brief project descriptions is at http://ntiaotiant2.ntia.doc.gov/top/awards/index.cfm. A search of the TOPS grants database at NTIA shows the most recent Arizona awards were made in 2001. The City of Tucson was awarded $824,644 in funds to create an online collaboration environment for unemployed and under-employed citizens in Tucson to help with training, employment services, and communication with possible employers. The Navajo Technology Empowerment Centers were awarded $875,000 in funds to establish a digital network for e-commerce development, e-training, and an electronic election system for all Navajo Nation general elections in the Western Navajo Agency. TOPs looks for innovative projects with a one-to-one or better cash match ratio (strictly audited) and a strong evaluation component. Typical TOPs grant amounts are in the $300-600K range. The average award in the FY 2003 cycle was $498,000, with the highest award given of $675,000 and the lowest of $148,000. TOPS grant funding for FY 2004 has not yet been announced, but should be in the $12-14 million range of recent years. For more information about TOPS, see their website at http://www.ntia.doc.gov/top/.

14.4.4 Public Telecommunications Facilities Program (PTFP)

PTFP is a competitive grant program that helps public broadcasting stations, state and local governments, Indian Tribes, and nonprofit organizations construct facilities to bring educational cultural programs using broadcast and non-broadcast telecommunications technologies. The major focus of the program is to extend the delivery of public radio and television to unserved areas of the United States, however PTFP can fund non-broadcast projects which activate a new public telecommunications facility, target a new and distinct audience, or extend the geographic area of service of an existing public telecommunications facility. Distance learning telecommunications facilities using non-broadcast technologies such as microwave, fiber-optic cable, satellite distribution, and Instructional Television Fixed Service (ITFS) are eligible for funding. PTFP awards funds to purchase equipment required to provide public

telecommunications services. Grant funds require a 25% match, however typically PTFP provides no more than 50% of the funds needed to replace, augment, or improve equipment. PTFP can fund planning projects. http://www.ntia.doc.gov/ptfp/

14.4.5 Department of Education (ED)

The U.S. Department of Education (ED) provides about $36 billion each year to states and school districts, primarily through formula-based grant programs, to improve elementary and secondary schools and meet the special needs of students. ED provides about $2.5 billion to help strengthen teaching and learning in colleges and other postsecondary institutions and about $3.3 billon to support rehabilitation, research and development, statistics, and assessment. The Department of Education does fund some discretionary competitive grant programs – typically projects that are funded need to be focused on an educational objective, of which technology purchase can be a step/part. For more information: http://www.ed.gov/fund/landing.jhtml?src=rt

Community Technology Centers Program: The ED Community Technology Centers grant program may allow small rural communities to expand their school-based Internet access (and upgrade bandwidth) into a broader community resource. Funding for the Community Technology Centers Program is based on HR 1, the No Child Left Behind Act. As described on the ED website, the purpose of the program is to create or expand community technology centers that will provide disadvantaged residents of economically distressed urban and rural communities with access to information technology and related training. The program promotes the development of model programs that demonstrate the educational effectiveness of technology in urban and rural areas and economically distressed communities. The Community Technology Centers are envisioned as providing access to information technology and related learning services to children and adults. More than access, the CTC program seeks to expand learning opportunities and to increase educational effectiveness through technology.
http://www.ed.gov/offices/OVAE/AdultEd/CTC/index.html

14.4.6 Department of Homeland Security

Homeland Security has provided a new source of federal funding which may be of some benefit to rural telecommunications infrastructure. Federal domestic funding for homeland security topped $42 billion in FY 2003 and continues funding into FY 2004. Homeland Security funds are routed through not less than 14 different federal agencies and take the form of at least 45 aid programs. Each congressional appropriation is tied to a specific federal agency charged with the responsibility of disseminating the funding according to the legislation that created the program.

Health care, emergency preparedness and public safety communication have been observed as priorities for Homeland Defense funding. In practice, however, large grant requests have been met with relatively low funding. A June report in the Arizona Republic noted that the state's $38.6 million in Homeland Security Grants was "in line with the national average but paltry considering that Maricopa County cities alone asked for $46 million". ["Ariz. terror funding assailed"; Stephanie Paterik, The Arizona Republic, Jun. 30, 2003] State officials divide the State

grant up among Arizona agencies and counties, and the counties distribute the funds to cities. Awarded grant proposals included a plan for radio equipment for the state that would allow multiple agencies to communicate with each other. It was reported also that counties along the Mexican border got a bigger share this year. According to the Arizona Republic article, the governor has said that protecting the border and encouraging regional cooperation are at the top of her to do list. Coordination of communication infrastructure efforts across all recipients will be a key element of any regional cooperation that may be developed.

The programs with some benefit to telecommunications are listed below:

Office for Domestic Preparedness: State Homeland Security Grant Program
The State of Arizona will receive $31.49 million in FY2004 to spend on planning, equipment acquisitions, training, and exercises for a variety of Homeland Security projects, including Cyber Security and Infrastructure (including telecommunications infrastructure) assessment and target hardening. 80% of the total funds must be passed through to units of local government. Information on these grants can be found at: http://www.homelandsecurity.az.gov. This re-granting process is being developed on a state level under the direction of:

Frank Navarrete
Director, Arizona Office of Homeland Security
1700 W Washington
Phoenix, AZ 85007
Phone: 602-542-7013
Fax: 602 364-1521

Office for Domestic Preparedness: Law Enforcement Terrorism Prevention Program
The State of Arizona will receive $9.344 million in FY2004 to spend on information sharing to preempt terrorist attacks, target hardening to reduce vulnerability, threat recognition, intervention activities, and interoperable communications. Eighty percent of the total funds must be passed through to units of local government. Again, this re-granting process is being developed on a state level under the direction of Frank Navarrete, Director, Arizona Office of Homeland Security (see contact information above). Information on grant opportunities should be posted at http://www.homelandsecurity.az.gov

14.4.7 Department of Justice (DOJ)

Department of Justice (DOJ): Interoperable Communications Program
The COPS program was appropriated $74 million in FY2003 (FY 2004 are yet to be determined) for communications interoperability which it awards through a discretionary program directed at first responders homeland security communications needs. In its first year of funding, the COPS office invited the largest Metropolitan Statistical Area from each state as well as the 50 largest MSA's to apply for initial funding for a total of 74 applicants. If this funding source is reauthorized in the future, there is the potential for funds to "trickle down" to other urban and rural areas. http://www.cops.usdoj.gov

Department of Justice (DOJ): Local Law Enforcement Block Grant Program (LLEBG)
LLEBG program dollars are formula based grants which provide funds to units of local government for projects which reduce crime and improve safety. Funds can be spent on procuring equipment, technology, and other related items. Funds are allocated by a formula and are awarded directly to units of local governments who apply. Applications are typically due in late spring or early summer. More information on the program can be found at http://www.ojp.usdoj/gov/BJA/grant/llebg_app.html

Department of Justice (DOJ): COPS More
The Community Oriented Policing Services office offers grants to help law enforcement agencies improve their operations through staffing and equipment. The COPS More program specifically focuses on acquisition of new technologies and equipment which promote efficiency and innovative approaches to solving crime and which increase officers deployed in community oriented policing because of time savings achieved from technology. Both mobile computing and video arraignment are fundable project areas.
http://www.cops.usdoj.gov

Office of Justice: Crime Identification Technology Act (CITA)
CITA provides assistance for virtually every technology based, criminal justice information, identification, and communications need. CITA funds also may be used to support state and local participation in national databases. States, in conjunction with local governments, may use funds awarded under CITA to improve or expand criminal justice technology efforts.
www.ojp.usdoj.gov/cita

NIJ Advanced Generation of Interoperability for Law Enforcement (AGILE) Program
The AGILE program addresses a broad range of interoperability issues across jurisdictional and regional boundaries. The AGILE program includes communications technology development, evaluation, development of open architecture standards, and an education campaign.
http://www.nlectc.org/agile/grants_funding/justnet.html

Federal Emergency Management Agency (FEMA), Emergency Management Performance Grants (EMPG)
EMPG grant funds assist the development, maintenance, and improvement of State emergency management capabilities, including disaster mitigation, preparedness, response, and recovery. Functional areas supported by the grant include communications and data sharing.
http://www.fema.gov/preparedness/empg.shtm

14.4.8 Department of Health and Human Services

The Department of Health and Human Services (HHS) has approximately 300 grant programs, most of which are administered in a decentralized manner by several agencies. For more information on all grant programs: http://www.hrsa.gov/grants/preview/default.htm

Nursing Education, Practice and Retention Grants (NEPR)
NEPR grants are awarded to projects which strengthen and enhance the capacity for nurse education, practice and retention to address nursing shortages. Priorities include providing education in new technologies, including distance learning methodologies and enhancing collaboration and communication among nurses and other health care professionals. Funds can be utilized to pay for technology and telecommunications which leverage desired outcomes for nursing education and retention.
http://fedgrants.gov/applicants/hhs/hrsa/gac/hrsa-04-014/grant.html

Institute of Museum and Library Services National Leadership Grants for Libraries
Leadership Grants are awarded to nonprofit organizations and institutions of higher education for several areas, including education and training of persons in library and information science, particularly in areas of new technology, research and demonstration projects related to the enhancement of library services through effective and efficient use of new technologies, the preservation or digitization of library materials and resources, and preserving and enhancing access to unique library resources useful to the broader community. More information on Leadership grants can be obtained at http://fedgrants.gov/applicants/imls/opla/opla/ngl-Lib/grant.html or by calling (202) 606-8537 or emailing imlsinfo@imls.gov

Economic Development Administration Public Works Program:
The Public Works Program empowers distressed communities in economic decline to revitalize, expand, and upgrade their physical infrastructure to attract new industry, encourage business expansion, diversify local economies, and generate or retain long term private sector jobs and investment. Past projects have included technology related infrastructure, distance learning facilities, and commercialization and deployment of innovative technologies.
http://www.eda.gov/InvestmentsGrants/Pgmguide.xml

Economic Adjustment Program
The Economic Adjustment Program assists state and local interests design and implement strategies to adjust or bring about change to an economy. The program focuses on areas that have experienced or are under threat of serious structural damage to the underlying economic base. The program predominately supports three activities – strategic planning, project implementation, and revolving loan funds. Activities can include construction of infrastructure improvements or loans to local business, which serve to help a community to diversity and stabilize its economy.
http://www.eda.gov/InvestmentsGrants/Pgmguide.xml

14.5 State Grant Opportunities

14.5.1 Arizona Department of Commerce (ADOC)

While no State of Arizona financial assistance programs currently exist for the express purpose of improving rural community telecommunications infrastructure, the Arizona Department of Commerce has recently administered grants for Community Telecommunications Assessments.

The products of these assessment grants include reports that could be valuable to county and local governments statewide for telecommunications infrastructure planning and development. The documentation includes a broadband technology study for the Community Telecommunications Assessment Program, and countywide assessments in four Arizona counties.

14.5.2 Community Development Block Grants (CDBG)

CDBG (administered by the AZ Department of Housing) is one example of a variety of federally-funded, state-facilitated grant and low interest loan programs which might assist in such efforts. Unfortunately, most of these address remediation of more traditional infrastructure needs such as housing, commercial economic development, and public works projects (parks, community centers, water systems). The Community Development Block Grant (CDBG) program is an example of these. However, CDBG's stringent demographic requirements and urban focus make it unsuitable for a wide-area technology infrastructure funding. CDBG may be useful in individual communities which can meet its national objectives, which include qualifying under the Low-Moderate Income National Objective, which requires at least 51 percent of the beneficiaries must be low to moderate-income persons. Telecommunications infrastructure may be included as a benefit, but may not qualify as the central purpose of a proposal. Public housing projects can include network access wiring, for example.

The CDBG program's inability to address rural telecommunications infrastructure issues has been noted. The Council of State Community Development Agencies (COSCDA) has included it as an issue in its Federal Advocacy Priorities for Fiscal year 2004:

> ***Modify CDBG to Allow Rural Telecommunication Programming***
>
> ***Issue:*** *Many rural areas have community development needs that include critical development of rural telecommunications systems. Poor rural communities find it difficult to attract private investment without rural telecommunications systems, yet telecommunications companies hesitate to install "broadband" systems in rural areas because no private companies are ready to use them. This "catch-22" is hurting community development in some rural areas. Yet, states wanting to help these rural communities have found that the design of the CDBG program often prohibits the use of CDBG funding for these rural telecommunication projects, because when large geographic areas are involved, some areas do not meet certain CDBG income eligibility tests.*
>
> ***Recommendation:*** *COSCDA calls for a modification in the CDBG statute to allow rural telecommunication projects to be eligible if a significant number of low-moderate income people are expected to be served by the project. States would determine the number of expected beneficiaries that would be considered "significant" based on demographic analyses of their state, and include this definition in their Consolidated Plan.* http://www.coscda.org/membersonly/03legpriorities.pdf

For more information on the Arizona CDBG program see
http://www.housingaz.com/sihirtestpreview.asp.

The willingness and extent of success in applying to such programs will depend upon a variety of factors, including the relative priorities of competing needs within the applicant community, competition from other communities' proposals, and the willingness of applicant communities to provide local cash match.

14.5.3 Government Information Technology Agency (GITA)

GITA is responsible for statewide information technology planning, coordinating, and consulting. The GITA Director serves as the Chief Information Officer for state government and has the responsibility to administer the state's Executive Branch IT resources. GITA will be responsible for the development of future state administered funding supports or incentive programs for telecommunications infrastructure development, although these may be administered through GITA coordinated programs within the Arizona Department of Commerce and other agencies. Currently GITA is drafting legislation that would allow the establishment of local telecom authorities that would be able to issue bonds for local/regional middle-mile and last mile telecommunications infrastructure projects.
http://gita.state.az.us/telecom

14.5.4 Arizona Criminal Justice Commission: Department of Justice (DOG): Edward Byrne Memorial State and Local Law Enforcement Assistance (Byrne Grants)

Byrne grants are awarded to the State of Arizona for use by the State and units of local government to improve the criminal justice system, and include the use of technology and telecommunications to improve law enforcement functions. Grant may be used to provide personnel, equipment, training, technical assistance, and information systems for criminal justice and law enforcement. Funds are allocated by formula to states and the state administering agency in turn sets its own application procedures for sub-grants to state and local governments. Byrne grant dollars are re-granted to local units of government under the direction of the Arizona Criminal Justice Commission. In Arizona, Byrne funds are re-granted for the purpose of assisting units of state and local government to develop and implement programs and projects that enhance and supports the 2004-2007 Arizona Drug, Gang & Violent Crime Control Strategy, approved by the Arizona Criminal Justice Commission.
http://www.acjc.state.az.us/grants/index.html

14.5.5 State Library Program

The State Library Program is a federal program which makes grants to state library administrative agencies which expend the funds directly and through sub-grants to local libraries for establishing or enhancing electronic linkages among or between libraries, electronically

linking libraries with educational, social, or information services, and paying costs for libraries to acquire or share computer systems and telecommunications technologies, among others. Although these funds typically do not address local infrastructure issues, they can be used to upgrade the bandwidth capability of a site, to participate in an aggregation scheme, and to provide some collective assistance in generating the community demand or "business case" which some vendors require for infrastructure upgrade. In Arizona, the State Library Program is administered by Arizona State Library, Archives and Public Records.
http://www.dlapr.lib.az.us/about/annualreport.cfm

14.5.6 Arizona Department of Education

The Arizona Department of Education has both technology support programs and Federal funding pass-through programs (such as Title I funding for schools). http://www.ade.state.az.us/programs/technology.asp

14.5.7 State Tax Credits

There are currently no programs in Arizona for State Tax credits in return for investment in furthering connectivity or bandwidth access in rural areas. Tax credit incentives may develop as part of GITA's efforts in the future development of funding and incentive programs for infrastructure development in Arizona. Other states have introduced investment tax credits for network infrastructure development.

One example of such a program is Colorado's Rural Telecommunications Enterprise zone program: http://www.dora.state.co.us/puc/telecom/rtez.htm

14.6 Private Foundation and Corporate Grant Sources

Foundation grant giving is determined by the income generated by the foundation's endowment, which fluctuates with financial markets and other real investments, so foundation giving in general is down, as is the American economy. Added to this, the internet and technology is no longer a hot area of interest for most foundations. As a result, technology-related grant giving has become more focused on "warm puppy" projects such as inner-city computer labs and assistance to girls and boys clubs with technology access, and not to any community-wide infrastructure issues.

In general, private foundations are not good sources for community telecommunications infrastructure development, but should be pursued for what they can offer in terms of public access (computer labs, etc.) and educational/social service application support. For example, Microsoft and Intel community relations assistance in Arizona has included much-needed technology training programs for teachers and administrators, as well as student programs. National companies with significant local presence in Arizona (such as Intel) will usually target grant programs to communities in which they have facilities and employees. Company foundations tend not to award grants in states or communities where they have no operational

presence. Grant seeking organizations in every community that has a cable system should contact or meet with community relations staff of their provider periodically to discuss potential areas of community support. Here are a few examples of national and localized (to Arizona) national foundation programs:

14.6.1 Public Safety Foundation of America

This private foundation provides competitive grants of up to $100,000 to support projects that are specific to the receipt and processing of 911 calls from wireless telephone devices. For more information, call (386) 322-2500 or go to the PSFA website: http://www.PSFA.us

14.6.2 Qwest Foundation

The Qwest Foundation awards grants to 501(c) (3) nonprofit organizations for County Education, Economic Development, and select community based programs. Projects are reviewed on an invitation-only basis. Project ideas that fit the guidelines can be submitted in a brief letter of inquiry, requesting an invitation to apply. Qwest looks for projects that support the community and generate high impact and measurable results. Their specific guidelines for eligible projects include those which support community-based development programs that promote economic growth; support community programs that build the capacity of organizations to provide service; and support the United Way.
http://www.qwest.com/about/company/sponsorships/foundation/

14.6.3 Bill and Melinda Gates Foundation

The Bill and Melinda Gates Foundation is one of the largest foundations in the world. The Foundation has numerous programs, some of which benefit telecommunications. The Broadband Connectivity grant, funded through the Bill and Melinda Gates Library Program, provides public libraries, library consortia and regional library networks with a fifty percent cash match towards first-time installation fees and equipment necessary to obtain a broadband connection. Broadband is defined as a connection speed of 200 Kb or greater. Funds can also be used to upgrade regional library networks to improve Internet connectivity to all libraries on the network, even those that may already have broadband connections. Grant funds can only be used towards the cost of installation for a new or upgraded broadband internet connection. Grant funds cannot be used for recurring Internet or telecom fees. In general, most installation charges are eligible. http://www.gatesfoundation.org/default.htm

14.6.4 US Cellular

The US Cellular *Connecting With Our Communities* program provides monetary contributions to nonprofit organizations in communities with a US Cellular presence in the areas of civic and community, education, health and human service, environment, and arts and culture.
http://www.uscc.com/uscellular/SilverStream/Pages/a_charitable.html

14.6.5 Cox Communications

Cox Communications is one example of a cable system provider in Arizona that has a well-established community relations program providing grant funding. Their website notes that "Cox Communications is a multi-service broadband communications company serving nearly 1.48 million residential and business service subscribers in Phoenix and Southern Arizona". Cox's 14,879-mile hybrid fiber coaxial cable network upgrade is completed throughout Phoenix and Southern Arizona, providing digital television, high-speed Internet access and telephone service. Cox is owned and operated by Atlanta-based Cox Communications, Inc., (NYSE: COX), which serves approximately 6.3 million customers nationwide. Locally, Cox contributes nearly $5 million annually in cash and in-kind contributions to community-based organizations, including local education, youth and development programs. Additional information about Cox in Phoenix is available at www.cox.com/phoenix, and Cox in Tucson at www.cox.com/tucson. Information about Cox charitable activities can be found at http://www.cox.com/phoenix/community/. Cox also has a "Model Technology School" program, with one example in Arizona, Horizon Charter School, in Phoenix. http://www.coxbusiness.com/systems/education/cshorizon.asp

Cox's "Line to Learning" program provides one complimentary cable modem line to accredited public and private schools and libraries in its service areas. Even for small schools and libraries this donation is primarily seen as a sample of service or marketing ploy that does little to meet the full internet access capabilities of recipients.
http://www.cox.com/education/linelearning/default.asp

Community cable system community relations/grant programs are typically scaled to the market size of a community, so that big-dollar support favors urban and metroplex areas. Collectively, rural governments may gain attention and funding by pursuing infrastructure development or access as an aggregate of cable subscriber communities. This would be a new tactic which could be generated from this report, or serve as a suggestion to cable system providers who ultimately read this report.

14.6.6 Intel Corporation (Arizona)

The Intel Corporation focuses its funding on education, with specific objectives of improving science and math education, improving the use of technology in the classroom, broadening access to technology, and encouraging women and minorities to enter technical careers. Intel supports selected projects through equipment, cash, and volunteers. For more information on programs: http://www.intel.com/community/arizona/education.htm

14.6.7 Motorola Corporation (Arizona)

Motorola funds education, diversity, environmental, and technology projects in Arizona. Projects are selected based on the project's ability to meet program guidelines and fulfill Motorola's business objectives. http://www.motorola.com/us/arizona/giving.html

14.6.8 Microsoft Corporation

The Microsoft Corporation has a global initiative called "Microsoft Unlimited Potential (UP)" which focuses on improving lifelong learning for disadvantaged young people and adults by providing technology skills through community technology and learning centers (CTLCs).Microsoft believes that providing technical skills training to disadvantaged individuals, will create social and economic opportunities that can change peoples' lives and transform communities. Last year alone, Microsoft and its employees gave more than $246.9 million in cash and software around the world to help people and communities realize their potential. http://www.microsoft.com/giving/display.asp?page=Strengthening

14.7 Other Potential Financing Mechanisms

Telecommunications projects are large, often complex projects, which typically need more funding than is available solely through existing grant and loan opportunities. To the degree that a project has a solid business plan with project sustainability, it may be able to secure venture capital funding. To the degree that a telecommunications project is viewed as basic community infrastructure, agencies of local government may be able to secure additional financing through traditional financing alternatives that are typically available for capital improvement projects. Financing alternatives include:

14.7.1 Venture Capital Funding

Access to capital is one of the most critical foundational elements for creation of new entrepreneurial or high tech companies. The uncertainty of the traditional private equity markets and the consolidation of local financial service providers have made it very difficult for early stage companies to find funding as more venture capital funds are flowing to later stage companies. PriceWaterhouseCoopers has compiled information on Venture Capital Funding in Arizona: http://www.ventureeconomics.com/vec/stats/2003q2/state_AZ.html

Arizona currently has a low level of venture capital funding; however the State is beginning to address this need. The Governor's Council on Innovation and Technology, in concert with the Flinn Foundation capital formation workgroup, has developed recommendations to facilitate formation of and access to capital. These recommendations include establishing an Arizona Small Business Opportunity Program as a tax credit program to encourage angel investing, establishing the Arizona Venture Capital Program through developing a $100 million pool of funds capitalized by the private sector with state tax credit support. In addition to the Venture Capital Fund, recommendations call for creation of a Native American/Rural Technology Fund which would be a source for direct, syndicated or matching investments in ventures designed to develop employment and infrastructure opportunities for tribal and rural citizens and unique investment capital assets for Arizona's technology community. Implementation of these recommendations will increase potential venture capital funding for telecommunications projects in Arizona.

14.7.2 Sales Tax

Jurisdictions have the option of developing specialty taxes. The tax can be placed on specialty uses, and can be targeted towards uses that primarily depend on non-residents. For example, one small Colorado community has a ½ cent sales tax for technology within the school district which is utilized for telecommunications and other technology needs. A sales tax would need to be approved by a vote of the electorate.

14.7.3 Bonds

Revenue bonds, general obligation bonds, municipal property corporation bonds, improvement district bonds, and community facility district bonds are all staples of municipal and county financing mechanisms. Bonds enable a local government agency to fund a capital infrastructure project with borrowed funds that are then paid back of a period of time. Typically bonds require a pledge or dedication of a future revenue stream as a part of the bond agreement. Many bonds must be approved by a public vote; however some, like the municipal property corporation bonds, do not need a public vote. The Greater Arizona Development Authority has the ability to support bonding efforts for infrastructure development and construction in Arizona.

14.7.4 Impact Fees

Impact Fees are fees that are charged to a developer to pay for a proportionate share of the cost of providing public facilities and infrastructure within a new development. The legislation surrounding impact fees requires a close nexus between the fee and the infrastructure benefit. Development fees are usually paid during the building permit process with funds going to pay for future development of infrastructure.

14.7.5 User Fees

User fees can be assessed to the users of a specific service to fully fund or to defray the cost of a project.

14.8 Researching Private, State and Federal Grant Opportunities

It is important to stay "in the loop" on potential funding opportunities, especially given the sometimes very short turn around time between formal announcement and grant deadline. Most grant programs are very similar from year to year, so utilizing information on past funding cycles is a good way to find out what the program will be this year and next year and use this information to develop a competitive program or project. When utilizing the search engines on any of the listed sites, it is often useful to conduct many searches utilizing a variety of key words. For example, some grants will feature the word technology instead of telecommunications. In addition, you can use Google or other search engines, although these are not always as efficient.

14.8.1 Private and Corporate Foundations

The following websites are a good place to start your additional research on private and corporate foundation grant opportunities:

http://www.lib.ci.tucson.az.us/grants/	The Tucson –Pima public library has a nonprofit grants and information center webpage dedicated to providing information on grants and grant writing.
http://www.azgrants.com/home.cfm	This "Just Grants Arizona" website features information on corporate and private foundations that give in Arizona. Access to some of the data requires a membership, other information (and links to funding sources) are free.
http://fdncenter.org/	The Foundation Center has a national database of private and corporate foundations and their giving priorities and guidelines. You have to pay a membership fee to access much of the data on this site.

14.8.2 State Grant Program Information and Resources

Information on grant and loan opportunities from the State of Arizona can be found on various department and agency websites. In addition, remember that many of the federal grant programs utilize state agencies to distribute funds to the local level. Thus, you can often find information about state administered grants on the federal websites as well. This means that State agencies are a good point of contact for both State and Federal grant programs.

http://www.az.gov/webapp/portal/	This website is the main portal for Arizona State government. You can use the search capability to look for grants in various areas (education, health, technology, telecommunications, etc.)
http://www.ade.az.gov/gme/	Arizona Department of Education grant site
http://acjc.state.az.us/grants/	Arizona Criminal Justice Commission grant site

14.8.3 Federal Grant Program Information and Resources

All Federal grant programs are listed in the Catalog of Federal Domestic Assistance (CFDA) which is compiled and maintained by the General Services Administration (GSA). The CFDA provides eligibility and program information and lists a specific contact for obtaining additional information and application forms. It also includes a helpful section on writing grant applications. The CFDA is published annually and updated mid-year. If you are interested in

viewing the complete, hardcopy text of the Catalog, it is available for reference in the government documents section of most major libraries and in the offices of State and local governments. It is also available on-line: www.gsa.gov/fdac/queryfdac.htm

As a part of its e-government initiative, the Federal government has been very proactive in making grant program information available on-line. This greatly simplifies the grant research process. The following websites will list both current and old grant program information. Information on old grants is still valuable, in that it provides grant program information for programs whose deadlines have passed, but where the programs are expected to continue. Thus, while the information might be for the FY2003 program, you can generally count on the FY2004 program being the same. This is extremely helpful for planning and project development, given the usually short to very short window between the formal grant program announcement and the application due date.

http://grants.gov/	The grants.gov website is the main portal for federal government wide grant opportunities. It provides information on virtually all of the federal government's discretionary (competitive) grant programs and allows you to search for keywords, find agencies and funding sources that might fit your program, and enroll to receive email alerts when agencies make funding (NOFA) announcements.
http://www.fedgrants.gov	The Fedgrants website allows you to search for keywords, find agencies and funding sources that might fit your program, and enroll to receive email alerts when agencies make funding (NOFA) announcements.
http://www.dhs.gov/grants	The Department of Homeland Security has launched this interagency grants and training website. DHS grants listed include those administered by the Office of Domestic Preparedness (ODP), the Federal Emergency Management Agency (FEMA), and the Transportation Security Administration (TSA). Other Federal agency programs include the Department of Health and Human Services' public health preparedness grants, Department of Justice grants for counter-terrorism and general-purpose law enforcement activities, and Environmental Protection Agency grants for enhancing the security of our Nation's water supplies.
http://www.os.dhhs.gov/grantsnet/	GrantsNet was created by the Department of Health and Human Services (DHHS) Office of Grants Management (OGM) for finding and exchanging information about HHS and other Federal grant programs. GrantsNet provides a variety of Department-wide grants policies governing the award and administration of grant activities, publishing

these in grants policy directives, regulations, and/or manuals.

http://www.usdoj.gov/10grants/ --------also check https://grants.ojp.usdoj.gov

The Department of Justice offers funding opportunities to conduct research, to support law enforcement activities in state and local jurisdictions, to provide training and technical assistance, and to implement programs that improve the criminal justice system. Many of the program bureaus and offices award formula grants to state agencies, which, in turn, sub-grant funds to units of state and local government. Discretionary grant funds are announced in the Federal Register or through program solicitations that can also be found through bureau and OJP Websites

http://www.cops.usdoj.gov/ The Community Oriented Policing Services Office (COPS) is a Department of Justice program which offers grants to help law enforcement agencies to hire more community policing officers, to acquire new technologies and equipment, to hire civilians for administrative tasks, and to promote innovative approaches to solving crime.

15.0 CONCLUSION

This report presents a broad review of the state of telecommunications development and use in Pinal and Gila counties. However, like a picture taken from a moving vehicle, it cannot claim to have included everything or that it shows the sharpest detail in what it presents. Over the approximately half-year process of observation, the infrastructure was changing, as were events elsewhere that may significantly affect it. To give just one example, in early December, 2003, Qwest's 271 application was approved by the FCC, allowing them back into the long distance market in Arizona. This may lead to cost cutting in the wide area data circuit market in Arizona and should eliminate some of the structural problems previously posed by LATA boundaries.

On the State level work is proceeding on draft legislation for a Broadband Development Authority and GITA continues its work on a "Statewide Telecom Roadmap." Among other efforts, ATIC also reports efforts toward expediting access to local, state, federal, and tribal rights of way, typically the earliest and most persistent stumbling block to infrastructure development.

To avoid allowing this document to become "shelf art," it is important for the Partnership to take action soon by finding approachable tasks and priorities in its broad selection of recommendations.

The process of surveying telecommunications use in Pinal and Gila counties effectively "stirred the pot" somewhat and may have provided an incentive to vendors to demonstrate good faith efforts at improving their services. It also may have discovered information that would not have been generally known otherwise. The Partnership should expect to hear corrections and comment on the contents of this document from vendors and stakeholders soon after it is made public.

What is most important is the theme in the report of the ongoing need for attention and action, if the Partnership is to provide leadership for accelerated development of telecommunications services and infrastructure in the counties. Every member of the Partnership should find opportunities for action in these pages.

16.0 APPENDICES

APPENDIX A – SAMPLE VISION STATEMENT

Logan County, Colorado

Vision Statement

The following vision statement was drafted, edited, and approved in consultation with the County Commissioners:

> To support, by participation, aggregation, and investment, the ongoing development and implementation of a countywide telecommunications network delivering advanced applications and services, including data, voice, and video.

What this will mean in practical terms is an infrastructure that will not present barriers to public and private users accessing advanced telecommunications technologies. The goal is a technology environment that is effectively equal to whatever is available in the most developed urban areas of our state.

The vision statement encompasses the following conditions and values:

- **Future "Scalability", adaptive to rapid changes in technology -** ideally the infrastructure should provide redundancy, "headroom" for advanced service development, and service options encompassing multiple technologies to allow for growth and rapid adoption of new technologies and advanced applications;

- **Cost concerns -** participation must be open to organizations at all budget levels, including the most modestly funded non-profit organizations, with a variety of both low cost and state-of-the-art high performance options made available to participating public sites and to the community at large;

- **Security concerns -** participation by safety, judicial, health care, and government entities may depend on providing multiple security options, including dedicated circuits, when necessary, and the ability to incorporate any new requirements that arise from "homeland defense" efforts;

- **Recognition of industrial requirements -** strong public sector participation will facilitate extension of connectivity to key commercial/agricultural industrial segments already in the County and establish the potential for new industrial development as well;

- **Public safety -** improved network communication such as videoconferencing will allow improved training and operational linkages between professional and voluntary public safety efforts such as police, health care first responders (EMS/EMT), firefighters, and county/region/statewide disaster recovery/homeland defense efforts;

- **Education -** recognize that the presence of a school district in some of the County's small communities presents an opportunity to extend the advantages of connectivity to local government and other public users through shared cost access capabilities within the federal e-rate subsidy program.

- **Health care -** enhance Sterling's position as a regional telemedicine center and discover any technology/infrastructure supports for improving access to health care services of all kinds for residents and health care professionals, with particular attention to improving quality of care and remote support for health care professionals and paraprofessionals within the county;

- **Agriculture -** support innovative uses of new network technologies for agricultural businesses in the County;

- **Resource sharing -** the county telecommunications assessment and plan will allow all public users an opportunity to find infrastructure sharing opportunities that might reduce costs and increase bandwidth access;

- **Resource awareness and use -** the infrastructure implementation should explore greater community awareness and use of underutilized resources such as the videoconferencing capabilities at Northeast Junior College;

- **Attracting additional investment -** increased participation and use of the currently available bandwidth will make a case for additional services and future telecommunications infrastructure development and upgrades in the County;

- **Community development and planning -** telecommunications infrastructure should be considered an essential element of requirements for new development in the County, just as other infrastructure needs, such as water and sewer, are now.

The vision calls for use of the available infrastructure to offer both sophistication and cost flexibility, with a commitment from the community toward resource sharing and ongoing collaborative development for more advanced, more widely available services, as they are introduced. It will bring value to the community by facilitating the adoption of advanced technology in the public sector and by market development (i.e., establishing the whole County as a better customer for telecommunications services) and accelerate the introduction and diffusion of technology in the broader private sector.

APPENDIX B – MEETING MATERIALS

- Agendas
- Sign up Sheets
- Newspaper Articles
- Needs Assessment Presentation
- Infrastructure Inventory Presentation
- Technology Plan Presentation

APPENDIX C – SURVEY

- Survey Form
- Survey Results

ALL COMMENTS ON SURVEY FORMS

GILA COUNTY PUBLIC AND PRIVATE

Globe/Miami	Bus	Direct line from Fargo HQ to Globe
Globe/Miami	Bus	High speed is available - my computer requires updating. I would like to be able to tell anyone who needs bandwidth, i.e. call centers or customer service centers - that high speed is available immediately at a reasonable price.
Globe/Miami	Bus	No competitive businesses here for telephone services. Qwest is not the best and lacks good customer service. I now have Tucson phone # because I only use my ISDN line - I don't want to have to pay over $100/month for the local line. I am secretary of the Board of Directors for Unity Healthcare Centers, Inc. We are in the process of starting a clinic in Claypool which will serve anyone regardless of their ability to pay. I reside in a building owned by the town and have my business there. The facility also houses a cultural center and museum.
Payson	Bus	All our corporate communications with ACE corporate are via Internet. We need simultaneous, 24-7 high speed access for 8-10 users. Also - our cash registers will be linked real-time to a central mainframe once broadband is available.
Payson	Bus	1. Cablevision will not bring their high speed cable to the Sawmill crossing complex. I have asked, we have offered to pay the cost of laying cable and they won't come over. 2. Satellite is available but is expensive. More importantly, satellite does not give you a static IP address. In order to be on our company's VPN we have to have a static IP. 3. If we had high speed access with a static IP, we would email on our VPN and we could utilize our company's web site for downloading larger files (10+MB). It would save us the cost of mail/UPS of training manuals, teleconference rates etc. We may even be able to start doing video conferences for our management teams.
Payson	Bus	I do billing and communication over Internet. If I had high speed could do more research which benefits patients.
Payson	Bus	We use Verizon cell service. Service is very good but we believe they operate in a non-competitive, predatory environment and that prices are too high. Cable TV service is terrible - that's why we do not subscribe. The package offered is minimal and price too high. The local service provider, Qwest, does not care about its small markets and does as little as possible to broaden service or improve infrastructure. Sometimes no long distance lines out of town are available. We would welcome a package of complete services as offered by Cox - such as local telephone, cable TV, high speed Internet - all rolled into one price.

Payson	Bus	We utilize document scanning over the regular landlines to our corp. office in Olympia, WA. This slows down the rest of our system to a crawl because we use the same land lines to hook the rest of our CRTs and then clients to the same computer in Olympia.
Payson	Bus	Our business is in the promotional product/ad specialty area. We do a lot of research for product information. (Data+photos+images), sending and receiving art files, placing on-line orders - PLUS - we would like to expand and grow our business with a larger & more comprehensive catalog and price lists.
Payson	Bus	Currently though our LAN-data transfers are slow. While we have updated our system to accommodate T-1 capability Qwest was charging "by mile." We have recently been notified that this is being dropped and we will be able to access T-1 at a reasonable rate.
Payson	Bus	Qwest is the sorriest excuse for a telecommunications company that there should ever be allowed to exist. They have no interest in serving current technologies to those of us in the rural areas. They put up barriers to other companies that would like to provide technology communications support in our area. Their costs for T-1 lines are horrific. They have no expressed interest in providing DSL. They should be barred from doing business in this state and the franchise should be granted to a company that cares about rural Arizona. I had to go to satellite to get some type of bandwidth. That is limited by weather and the number of users. I feel Qwest overcharges for their telephone service, but if they would perform by proving current technology, I wouldn't be complaining. They most generally have dependable local service. I use The River Internet access company for my dial up access. It too is a poor company. I recently paid a year in advance to take advantage of a discount and then experienced an immediate downgrade in service. It was gotten to the point that they are too frustrating to use. Before The River, I had Goodnet, which abruptly went out of business. We severely need a dependable broadband provider in this area.
Payson	Cnty	One microwave connection for long distance - ATMs - and any other outside communications. This affects all residential and businesses. Last winter it froze.
Payson	Edu	Qwest needs to complete the fiber loop to the Valley so Payson is not limited or handicapped by the Mt. Ord microwave repeater. Have T-1 point to point from the high school to the other schools.
Payson	Med	We would like to download data to our other offices. We would like to download CT scans and x-rays. Tele-medicine would be beneficial. We use email now and do research on the Internet. Anything would be better than we have now. We send a lot of information over the fax. It is slow and wastes time.
Payson	NP	Absolutely hate Qwest. Cost is vital.
Payson	NP	Typical problems are loss of Internet connection, difficulty connecting, long e-mail & data transfer times & multiple tries to successfully transfer data. Also - inability to get Internet information in a reasonable period of time. I have an engineering business in California and I maintain a web site for the northern Gila County shooting range (Tonto Rim Sports Club).

Payson	NP	Almost every afternoon, I get disconnected from Cybertrails. Slow processing - my time could e used more efficiently. Our main database requires access to Internet. When uploading or downloading information it is sooo slow. It is located in Kansas City - our server for MLS - sending listing info with pictures via email is a slow process.
Payson	SOHO	Current Issues: AT&T Global services (AGNS) has a secure network but from Payson, I have to dial long distance within State or out of State. No high speed options from Payson. High speed cable is not secure. Morgan Stanley Systems I access require VPN for connection options other than AGNS. Problems: As a business technology consultant, some of the analysis and development tools I use operate very slowly; this causes a 1 hour task to become 3-4 hours. If high speed was available, I would use it 32-40 ours per week for research, analysis, design, programming, testing of financial system. The connection would require VPN.
Payson	SOHO	Downloading PDF files (research) sometimes takes a long time. Most annoying problem - getting kicked off just as I'm getting ready to send a business email.
Pine	SOHO	Please, we need broadband!! We send links and photos daily and dialup is so slow. We get kicked offline before the task is finished and have to start over. Thank you.
Young	Bus	Best to keep off Internet for security purposes.

GILA COUNTY RESIDENTIAL

	Copper Canyon Ranch area is several miles East of Globe. Approximately 160 lots are being developed. Over 110 lots are already sold. Electric is run to 110 lots but no land lines to homes-must use cellular service for phone, satellite for TV and Internet. Presently 2 residents are utilizing satellite internet because of business and or educational needs. Other residents want internet but satellite application is too expensive at this time. Am working
Globe/Miami	with several communication outfits presently for phone and internet service through the developer.
Globe/Miami	Do not currently have computer at home. Use computer at work org.
Globe/Miami	If the price was right I'd have it.
Globe/Miami	More affordable high speed connection.
Globe/Miami	Slow communications. Do not have to pay long distance. Occasional downtime with no lines available. Would use high speed for a better computer connection.
Globe/Miami	To check email, e-commerce. Problems occur when high usage renders connection very slow or impossible. Time wasted while awaiting connections, lost phone calls due to line being tied up. Slow downloads of email or e-commerce data. Would use high speed to research more info or any subject. More responsive when using internet for e-commerce, more efficient use of my time.
Payson	(1) Cablevision still requires phone line to upload. This was supposed to be corrected 18 months ago. (2) Email is #1; research for work; sending/receiving larger files (audio/video) from family & friends.
Payson	As far as cellular phone service, I get disconnected, can't get out to call-no service in area. As far as long distance I use a 10-10 code that seems to work fine. Computer is slow, but my computer is older '98 so it may be that.
Payson	Cable service slow coming but it is here and excellent! Is this survey and expenses really necessary? Seems like a waste of time and our money to tell us what? Why not ask Cablevision, Cox or the other large providers- their homework has been done long ago.
Payson	Can't get on sometimes till I redial 2 or 3 times. Connection speed is never 56k. Fastest ever reported by IE is 40k. File downloads are interrupted/not complete-OFTEN! Streaming video/music is impossible.
Payson	Dial-up too slow. With the growing popularity of broadband internet, websites have become much larger, taking longer to access. If you have satellite TV you can't get cable internet. Satellite internet is way overpriced and DSL or other forms of broadband are not available. Also, our cable company doesn't seem to compare as well to larger market companies like Cox is pricing and features local number. Verizon and Alltel are the only cellular options and neither is one I would pick on my own if more options were open. I would use high-speed internet for surfing, downloading music and online multiplayer gaming.
Payson	I have a T-1 line at my Cottonwood office. It is not really much more useful than a dial-up account. If it were not a

	business related item I would not even bother. The extra charges are not a worthwhile expense.
Payson	I would be on the Internet more if it were faster. I would use it more for my daughter, who is in high school. One of her classes requires Internet access. She would love it for music. We would be able to use it for our business more. We are in the process of building a home and I could use it for finding items easier.
Payson	I would like high speed internet for emailing and down loading music. I spend a lot of my time on the internet. I make all my travel plans on line and keep updated in my field for educational purposes. I can get my educational credits online when I need them. Cybertrails is too slow and I sometimes have trouble getting online. Their support is bad and unavailable most of the time. The cost is high considering what you can get in the valley for a lot less.
Payson	I would like high-speed Internet for emailing and downloading music. I spend a lot of time on the Internet. I make all my travel plans on line and keep updated in my field for educational purposes. I can get my educational credits online when I need them. Cybertrails is too slow and I sometimes have trouble getting online. Their support is bad and unavailable most of the time. The cost is high considering what you can get in the Valley for a lot less.
Payson	If high-speed connection were available, wouldn't bother.
Payson	If I had available to me-at no cost to me-high speed internet connection I would use it no different than what I use the internet now.
Payson	It would be much more convenient with a higher speed.
Payson	It would be much more convenient with a higher speed.
Payson	My high speed internet provider, I believe, does not use updated equipment. Internet gives too much trouble too many times.
Payson	Need better service, less $.
Payson	Need high speed Internet for business e-mail. Also need Internet provider with local or 800 access by phone (unless available with cable).
Payson	No ability to stop spam or junk email other than personal software. The company I work with desperately needs your services. I gave them a commercial survey (Longevity Plus). Unreliable satellite connection puts int'l research -Dr's work- down often. No cable high speed access to building.
Payson	Our Internet service with high-speed digital cable service is very good - the digital cable TV is not always very good - Both are high $$, especially the Internet service. Cell phone services is not very good - signals weak & spotty in many areas.
Payson	Phone coverage is very unsatisfactory in rural areas.
Payson	Slow - would like to transmit pictures and files much faster.
Payson	Speed and reliability are critical issues for me.

Payson	The TV cable is fuzzy in my area; not as clear as satellite service. I would like the cable service to stop most of the Pop Ups…you can't work without PopUps.
Payson	Too tedious & time consuming to try to use Internet. Would be more willing to shop on-line if it was easier/faster.
Payson	Using several cell phones and land lines, trying to run a business, getting cut off, dropped, or very slow connections. Would use anything which would help.
Payson	We would use high-speed connection for personal use. However, to be able to spend less time waiting for pages to load would be wonderful.
Payson	When I need to quickly look something up, I can't do it quickly and end up just shutting the computer down. Other than this, I have no other problems.
Payson	Without TV service I would like internet news etc. Problem is-if I don't have cable service what are the chances I will have any high speed service by any other means?
Payson	Yes. Want more for less$$.
Pine/Strawberry	Cypertrails=frequent loss of "Internet Provider" and overload - cannot access. Qwest=periods of business day when I am unable to dial exchanges 602,480,623 from my 928 area code. Qwest has very high rates for in-state area code to other area code rates. I use a CostCo calling card for <u>all</u> in-state and out-state long distance calls.
Pine/Strawberry	I would like a high-speed connection to enhance husband's home based business. Includes research communication via e-mail. Also would like ability to do e-commerce and web-hosting.
Sacaton	Qwest is the only reason I have no home phone. Terrible customer service and outrageous pricing.

PINAL COUNTY PUBLIC AND PRIVATE

Apache Jct	Bus	Have dial-up, cable modem, ISDN and T-1.
Apache Jct	Bus	Company line in Tempe, AZ
Apache Jct	NP	No problems.
Apache Jct	NP	The biggest problem with all of these services is the COST. Getting to speak to someone at all of the providers is almost impossible. Technical support is poor.
Apache Jct	NP	Our biggest problem is "bounces" in sections of the T-1 frame relay. When a segment goes down, there is no other route to move the traffic to. Consequently, staff on that segment are down. If it's the main segment, to the server, all staff are denied access to the network.
Apache Jct	NP	Lack of facilities to lure new businesses.
Apache Jct	SOHO	What is this? Most of it is already available. All could help but not necessary at this time for us.
Arizona City	Bus	Since we are a real estate company, all of our MLS is now on the Internet along with title company and the county information as well. Almost everything we do pertains to the Internet one way or another. This service would be a very valuable asset to my business as all of Pinal County is in growth frenzy and we need to have this in place and ready to go as we grow. Any questions please call.
Casa Grande	Bus	SLOW - not reliable. Cannot do large downloads. Cannot video conference. I would like to believe that Casa Grande Internet does the best they can. With what they have to work with as far as telephone service to and from them to us is beyond their control. They do provide great customer service. Qwest, on the other hand, is frustrating to deal with and is expensive.
Casa Grande	Bus	Slow connections; booted off after "lag time", etc.
Casa Grande	Bus	It is critical that the County have broad bandwidth Internet capability. B to B capability within the County would improve efficiency. Those f us doing business outside the County - it is a necessity.
Casa Grande	Bus	Always falling off Internet - loss of connect - long download times. If it was fast connection, I'd fix the problems I have listed above.
Casa Grande	Bus	I'm a FEDEX and UPS Shipping Center & high speed Internet is a need to provide faster service to my customers; especially when the winter visitors arrive to reduce the wait period.
Casa Grande	Bus	Our frustration with slow speed on the Internet drove us to spend extra $$ to install wireless in one building. Couldn't be more satisfied. DSL & Cox Cable are too late getting here!
Casa Grande	Bus	I don't want to put in additional phone line so I have to use my currently substandard line, which has extremely slow data transfer rate. I need high speed access in order to connect to my suppliers to check on pricing & product availability. I need to be able to search nationwide for hard-to-find parts. I need to be able to check my e-mail from the office so that I can respond in a more timely manner.

Casa Grande	Bus	Too many to list.
Casa Grande	Bus	Better customer service needed. DSL and high speed cable.
Casa Grande	Bus	Delayed Internet searches; unable to expand my practice as a physician in the area due to lack of high speed options. It is also frustrating to do personal e-mail & stay linked with family and partners.
Casa Grande	Edu	We are in the process of developing an ITV system among our schools. We will have 3 of our schools connected this year. Our initial problem is the trash dump between Coolidge and Florence. It is so tall that we cannot connect Florence to CAC because it is in the line-of-site.
Casa Grande	Med	I would like to have one service provider for all of my telecommunication needs. Many services offered by practice management companies require DSL or T-1 lines. I can't even enroll with these companies due to the situation in Casa Grande. High speed connection would be essential for an Internet electronic medical practice suite set up. This would make our office the most efficient set up possible. It would speed up all facets of the medical office job functions. Financially, it is imperative to run a successful & profitable practice.
Casa Grande	Med	Providers make it hard to switch. Picture freezes. DSL & cable modem are unavailable. I think the city or the county should temporarily take over service provision to put the providers on notice.
Casa Grande	NP	The cost is not just the monthly Internet access fee; its also installation & monthly line fee, which is too expensive for a small organization. The problem is not necessarily with the current providers, but rather the cost associated with "upgrading" to faster/better connections.
Casa Grande	NP	Switched to wireless Sept 1, 2003.
Casa Grande	NP	The Internet connection has a hard time connecting on our computers.
Casa Grande	SOHO	I work out of my home for a large computer company. I need high speed access but so far I can't get it. I am not willing to go to 2-way satellite but my VPN access to my company's network doesn't work well with 2-way satellite due to latency problems. I have tried for DSL but I'm too far away from phone switching office. I have checked with Cox but they are unresponsive.
Casa Grande	SOHO	Starband not as fast as cable modem. My programs don't run as fast on satellite and I pay 2.5 times more $$.
Casa Grande	SOHO	I work from home - need use of cable - satellite does not work. Desperate for DSL or cable high speed Internet for various reasons (games, shopping, video, etc.). We need high speed lines in Casa Grande.
Casa Grande	SOHO	I'm a realtor and it takes a long time to pull up houses on MLS. My time is valuable, I need a faster connection. I also would like Starz, but Cox doesn't have it and I don't like satellite. I am all for faster Internet, digital phones & cable, etc.

Casa Grande	SOHO	I am a realtor and very busy right now. We supposedly have Netbeam at work, but it is unreliable, frequently goes out and slows me down. As far as my cellular phone, the cost goes up every month. I can't switch services without it costing me a fortune since my cell phone number is on my signs. (I was switched to this service when my old service was sold.)
Casa Grande	SOHO	E-mail composition hard to send, takes forever. Downloads very slow.
Casa Grande	SOHO	Need high speed for my work - involves transfer of large files at times and receiving large files.
Casa Grande	SOHO	Our phone lines at present disconnect suddenly while on the Internet - sometimes it takes 10 minutes to connect ok. The system times out and we have to wait for a different time to use the Internet - middle of the day is a particularly hard time to keep a connection and we work from home needing all day links to be secure.
Casa Grande	SOHO	I work out of my home 4 days/week, so a high speed connection is critical. My only option at this time is satellite, and I would prefer not to pay $600 for equipment.
Casa Grande	SOHO	Wasted time because of slow processing for business and home. Connection lost occasionally, get bumped.
Casa Grande	SOHO	I work for Wells Fargo and am able to work from home. However, I cannot use satellite Internet to connect to the bank, so I'm still with a very slow phone line. We have friends and family who will not move to Casa Grande because of the lack of high speed Internet.
Casa Grande	SOHO	My Internet use is pretty much limited to checking e-mail, looking up information on contractors, reporting to different agencies and updating business programs.
Casa Grande	SOHO	Most of my work is done online and slow connections make for a longer day; not to mention dial-up time.
Casa Grande	SOHO	Sorry this is late. Need high speed to conduct business from home.
Casa Grande	SOHO	We do not have any problems regarding high speed Internet. We only use the Internet for e-mail & product orders. We run a business. So far, regular service has been very good.
Casa Grande	SOHO	Need high-speed bandwidth to expand at-home business.
Casa Grande	SOHO	Hard to log on. Disconnects all the time. We download large database (real estate MLS info) and it takes too long if we can stay connected. Download large databases and would probably surf more.
Casa Grande	SOHO	[A] Current issues: AT&T Global Services (AGNS) has a secure network, but from Payson, I have to dial long distance within State or out of State - no high speed options from Payson; (2) High Speed cable is not secure; (3)Morgan Stanley Systems I access require VPN for connection options other than AGNS. [B] Problems: As a business technology consultant, some of the analysis and development tools I use operate very slowly. This causes a one hour task to become 3-4 hours. [C] If high-speed were available, I would use it 32-40 hours per week for: Research, analysis, design, programming, testing of financial systems. The connection would require VPN.
Casa Grande	SOHO	Ordering product for my business is very slow. Very concerned about provider security, what measures are

		taken when hackers are detected? Secure, safe data flow! A MUST!
Casa Grande	SOHO	E-mailing documents with pictures/graphics takes a longtime.
Casa Grande	SOHO	I would use it at my office and at home. It is critical for my business and dial up is extremely frustrating. I have my own web page and send links as well as photos. Please bring us broadband!!. Thank you for asking!
Coolidge	Edu	We have built our own high speed network, largely because there was no high speed access available. Qwest has been unresponsive and unwilling to offer service. No cable company has expressed interest in offering services. Common carriers have been unwilling or unable to cross the LATA so we can link all of our campuses.
Eloy	Bus	How state is divided up for cost of calls, our landlines are long distance to our cell phones, so we can not call them without paying out of state long distance charges.
Eloy	Bus	I already have high speed Internet.
Eloy	Bus	Wireless ISP serving Eloy and Toltec
Eloy	NP	The dial up service needs to be upgraded for agencies or businesses that can afford high-speed bandwidth.
Florence	Bus	I e-file returns and interface with IRA and the Arizona Dept of Revenue and other governmental agencies frequently. I spend too much time waiting for forms to load, etc. Also all these agencies are providing more on-line services. I need to be faster & more efficient.
Florence	Bus	The Industrial Development Authority is newly created - are now acquiring office space and ordering office machinery-office supplies. Am simply curious of your presentation!
Florence	Bus	The Florence Central Office is so antiquated. No ISDN, no DSL, no frame relay, no fractional service. We are looking at wireless.
Florence	Bus	Many of the questions asked are not able to be answered on our facility level. Our home office in Nashville, TN is responsible for negotiating and setting up services. I will be in contact with them for the missing information.
Florence	SOHO	Do much communication with insurance carriers on Internet. Just need faster connection and data transfer.
Kearny	Town	When computers for public access are used, working in general slows way down. Also, the process of checking in and out patrons slows down.
Mammoth	County	We have a lot of trouble with our phone service in this area. It seems to go out every time it rains. Our long distance is provided through the T-1 line via Oracle, which seems to be improving with each passing day. We also receive our Internet and County connections through the T-1 line.
Oracle	Bus	I am self employed as a writer/editor and designer of multi media texts. For this activity, more speed AND MORE RELIABLE CONNECTION is very important. Also, when and if I can get better and faster service, I would engage in Web commerce.

PINAL COUNTY RESIDENTIAL

Apache Junction	According to information, high speed bandwidth is the way to go.
Apache Junction	Fast connections are a must in today's world. We need Cox high speed internet out here in AZ. Mediacom charges an arm and a leg (and then another leg). I don't care if you oust Mediacom and replace them with Cox, just do something. I will point out though that competition will lower rates the fastest. FYI a whole lot of people here have no love for Mediacom.
Apache Junction	Had AOL. Say no to AOL! Slow speed connecting and being continually booted out of system and having to reconnect.
Apache Junction	Have but recently relocated to area. Not getting cable TV or ISP until settled then will get high speed.
Apache Junction	Have no need.
Apache Junction	I am satisfied with our present system.
Apache Junction	I feel our cable (Media Com) is over priced and what we get is many old TV. shows. I feel a telephone co. should be able to offer a phone and computer line for less than they charge now.
Apache Junction	I feel the phone co could provide a 2-line system for phone and computer a lot cheaper than they offer. The cable company is the worst in the nation - too many repeat shows-too many old shows-we should get more for the money. They charge way too expensive.
Apache Junction	I use internet daily. Unfortunately, Bband isn't available. I have been here two years and still not available.
Apache Junction	I leave my home to use it daily.
Apache Junction	I'd be on line sooner or be able to read my email and go to bed earlier.
Apache Junction	Just the ease of connecting faster = faster research and opening e-mail attachment. For some reason I can't always secure an internet connection. I presume there are only so many people that connect at once and my turn didn't occur
Apache Junction	Live in mobile home park - not sure they would let it in.
Apache Junction	Often can't get online ("page cannot be displayed" appears); very slow loading of pages: I use my internet connection for educational purposes and for email.
Apache Junction	Qwest has not put new copper or equipment in AZ unless it was NEW DEVELOPMENT for years! They need to upgrade, not just say they will.
Apache Junction	Right now I'm still learning about the Internet, and I'm learning that this computer thing is a whole lot more useful that the past rep it has had. I have a new found love, the computer. It's my 2d best friend; God will always be #1.
Apache Junction	Right now it takes quite a while to download anything from Internet. I would like a high-speed to maximize my time on my computer.

Apache Junction	Since we are not able to choose companies, none of them are interested in customer service. I live right in town and moved 1 mile away and was unable to get cable or DSL. And satellite internet is more expensive than I want to pay for the same service that should be available to me though the negligent cable and phone company. Get rid of the monopolies if you want to improve things and allow Cox cable into Pinal County.
Apache Junction	Slow to download files and picture attachments to emails. Also, some websites load very slowly.
Apache Junction	The cost is acceptable, however the speed and accuracy lack severely. I would use my computer more and use things available on Internet if I had high-speed capabilities. It would be much more convenient to combine my satellite provider with computer if only it was cost effective. I would get so much more out of computer capabilities. Research, education and all around Internet services if I had better services such as high-speed and phone services available at reasonable prices...
Apache Junction	The main issue with both cable TV and high-speed Internet service is the intensive outages and down time. We experience on a regular basis.
Apache Junction	The slowness of the Internet forces us to use it minimally. Using the Internet for research to check out advertisements of interest, do surveys, and enjoy forwarded messages from family and friends is too time-consuming and frustrating. So we find ourselves forced to use other resources. Additional recommendation: consolidate all services (cable, Internet, telephone) into one bill providing customers with a discount for signing up for a consolidated service.
Apache Junction	Things seem to move slow, very slow. The system seems to be somewhat delayed at times - like it's lost or confused about something. I like to get in and out, while other times I need to search which takes the longest. I get frustrated and irritated. I would be grateful for something that for something that moves faster so I can get more done in less time. I really don't use it for work much, it's more for school.
Apache Junction	Very difficult + frustrating to use internet for research on media/issues, travel info, making reservations, etc. Also spouse is self employed musician who is trying to create a website for sales of CD's and downloading and sharing sample music filer. Mediacom's high speed connection seems very expensive compared to what we pay now - Double.
Apache Junction	Very poor cell phone service within my residence.
Apache Junction	We would use it only if it were included in our current fee. Would not be willing to pay more.
Apache Junction	Well, the computers I have rather slow and sometimes won't open a page for some reason. But, if we had faster computers I think it would change the way we use Internet and phones.
Apache Junction	Work from home, homework
Arizona City	Disconnected during various times. Slow downloads. A faster service would ensure my online education would be efficient.
Arizona City	I have been unable to take advantage of my online education because of the slowness of the Internet.

Arizona City	Slow downloads or frequent interruptions of downloads. Loss of connection to provider. Would use more authorized demo's with high-speed connection.
Arizona City	To give me high-speed Internet access is like giving me gold. Currently, it takes me at least an hour to check my email. This is not because of spam-no this is because it takes anywhere from 5 to 10 minutes to load just one page! I have plans to build an e-business. I am going to school to learn how to design web pages. Once I get this task accomplished, I want to design web pages as my own e-business. If I had high-speed access, I could do this with more ease and I know I would be successful. The current speed (56k) is too slow. Bring on the high-speed Internet!
Casa Grande	"Time out" loading. Research and Internet purchases. Internet banking/bill payment.
Casa Grande	(1) Most of my long distance is done over cell phone. Other is with low cost calling cards @ 2.9 cents minute. (2) My family uses Internet for many things - research, banking, reservations & chatting w/friends. High speed bandwidth would allow us to use multiple computers on Net w/o tying up the phone line. Neither Qwest nor Cox can provide currently. Wireless is not available w/o putting an ugly DISH Network on top of my hose, which would violate neighborhood CC&Rs.
Casa Grande	(1) Not being able to connect, i.e. get message ISP failed to respond. (2) Constantly having computer freeze up or getting bumped off line.
Casa Grande	(1)Drops, freezes, pages take too long to load, spam, email very slow to open, lose connection. (2) On-line banking, email, Internet orders, research, telecommuting.
Casa Grande	(1)We in Casa Grande have no choices for high-speed Internet connection. We were forced to spend over $600 for satellite connection & $60 a month for service. (2) The cell phone provider we use is out of Phoenix, but connections in Casa Grande are not dependable, with frequent "dropped calls."
Casa Grande	18.8 dial up connection is best bandwidth avail to Qwest, although I have a 52K modem. I transfer files & dialup is too slow. If high speed were available I would be able to spend much less time transferring data and doing research. Often, if a file sent to me is too huge, I may lose the dial-up connection before download is complete - very frustrating. I would also use video conferencing. I cannot understand why a community with 30k plus residents does not have access to DSL/high speed. Where is the money we pay for "universal access fees" going? I though that was for rural areas like us.
Casa Grande	3 hours of work takes me 5 hours on my current connection. I work at home so high speed would be (is) a necessity.
Casa Grande	A high speed connection is like the Concorde. Nice to have, but at my age (66 and retired) is not the ultimate need.
Casa Grande	Actually, I am happy with current providers. Access to the Internet could be speedier, but isn't crucial.
Casa Grande	All I can say is that since moving from Tucson and not having high speed Internet, it causes a big

	imposition in our lives.
Casa Grande	Always being dropped while on line. Can't get on server busy. I would like to get cable back with Internet on it so I can get rid of 2nd phone line.
Casa Grande	Always getting bumped off. Downloads take forever so sessions expire before I can complete the work.
Casa Grande	AOL is constantly disconnecting. It takes forever to download and upload anything. Dial up service is very poor.
Casa Grande	As much as possible. I don't get on my computer enough. I will be retiring soon and my computer time will increase.
Casa Grande	Barely use internet at home - too slow, inconsistent connectivity. It never fails - when I do use the Internet it looses its connection during a critical time.
Casa Grande	Cable service (TV) - picture and sound on several stations is not always satisfactory (Ex: channel 3 for Diamondbacks ball games frequently poor reception - visual and audio). Internet Service: frequently very slow website searches and downloads.
Casa Grande	Can use Internet at work. Do not want access in my home. Cable is very expensive - too bad not another choice other than satellite.
Casa Grande	Can't really say much, new to the area and don't know just what to expect, or exactly what is provided.
Casa Grande	Casa Grande Internet Wireless high-speed at work - excellent; dialup at home - horrible. School online services are terrible on a dialup.
Casa Grande	Cell phone Verizon - more times than not, call doesn't go through or it's cut off, lost connection, very poor service. Have been waiting too long for DSL - faster computer would give me more time to do something other than waiting.
Casa Grande	Connections/data transfer slow; getting bumped off all the time; Net is not an option as it is cost prohibitive; Casa Grande is growing & we need to come out of the dark ages on telecommunications.
Casa Grande	cost a lot for little service
Casa Grande	Cost of 3 separate services plus cell phones exceeds $200 per month.
Casa Grande	Cost on all services, time on hold to speak to someone, Internet service I'm always getting kicked off during procedures. Cell phone unused minutes not carried over but if we go over we are charged. Qwest has all the FCC and tax charges that are ridiculous.
Casa Grande	Cox Communications has indicated that they plant to roll out a high speed Internet service through their cable infrastructure by June 2004.
Casa Grande	Cox does not offer high speed internet in Casa Grande that is very upsetting to me.

Casa Grande	Current Internet connection with Netbeam in my opinion is too costly for the speed provided ($70/mo for 384k). Has frequent downtime lately due to technical problems and am not terribly satisfied with their tech support. I use my Internet connection mostly for online computer gaming, Internet surfing, and multimedia downloading (music, video, etc.).
Casa Grande	Currently dial-up connection with AOL is at best extremely slow; getting on is taking longer than it should. Searching the Internet is a chore with AOL. Communicating and downloading are what I will be interested in.
Casa Grande	Cybertrails has been a good company, but I very much want to have higher speed. I really don't care if I get it from Cybertrails, Qwest, Cox or someone else.
Casa Grande	Day trading commodities.
Casa Grande	Dial up connection is extremely slow. System disconnects and reconnects on its own while working online.
Casa Grande	Dial-up is wasting too much of our time - very annoying
Casa Grande	Do not need high speed - do not utilize Internet that much.
Casa Grande	Do not need high speed connections.
Casa Grande	Do not spend much time on the Internet; @ 28.8 it is too slow due to phone line issues. Cannot make the most of what the Internet has to offer.
Casa Grande	Don't own a computer.
Casa Grande	Don't use computers and have no plan to use one in future.
Casa Grande	Downloading, Data, surfing the web.
Casa Grande	Drop off and during the daytime very slow speed.
Casa Grande	Frequent disconnects and slow speeds.
Casa Grande	Government should stay out of anything to do with communications, i.e. City forced cable company to increase channels and then we had to pay an increase in cost.
Casa Grande	Had I known that there was no high speed connection here - I would have moved somewhere else - you need to bring Cable America - They're the best.
Casa Grande	Have wireless.
Casa Grande	Hi Speed would save a lot of time!
Casa Grande	High speed access would prevent excessively long time for downloads and/or surfing: would allow better video and audio reception.
Casa Grande	High speed connections need much improved phone lines. AOL advertises spam control but unseemly material constantly gets through to my 6 year old child's account. Cox has promised cable Internet access by Jan 2004.

Casa Grande	High speed connections would just make the work I'm doing now easier. I use email, pay bills online, all my banking, monitor mortgage balances. All airline and hotel car rentals are done online & although the convenience is there, the time required is too much. I can see that I'll be using the online more & more but the speed is just so slow I have to be doing something else, TV etc, while I'm online.
Casa Grande	High speed internet would be extremely helpful with teaching my children internet skills. The way dial up is it is too slow to keep children interested. I would switch to any other means of local phone service. I only keep it because of my internet requirement.
Casa Grande	I am currently involved in a distance learning program through NAV. Low speed Internet connection (45.2) makes this more difficult. Very slow download speeds (4K) makes downloading software updates, patches, media files, extremely frustrating. T-Mobile has a very spotty coverage in area. Frequently lose connection. Biggest frustration with Cox is lack of cable modem access.
Casa Grande	I am going to school, but couldn't get online or was immediately bumped off. The servers in this area aren't big enough. It gets worse once the snowbirds are here. Made my work 3 times harder (I'm talking about the Internet).
Casa Grande	I am looking for a high speed alternative to give me the ability to work from home. I work in Chandler - if I could work from home 1-3 days per week I would save money for gas and also the wear on my vehicle. I am very interested and would totally support improved telecommunication alternatives.
Casa Grande	I am not familiar enough to ask the right questions.
Casa Grande	I am not too happy with all telecommunications companies. I think all such companies are deceitful and liars. Their primary purpose is to cheat the general public and each other.
Casa Grande	I am satisfied with AOL but think as a senior citizen, it is too expensive for my needs. But my children are in another state and it is a nice feature to keep up with them often and the phone is not in the picture. Too expensive.
Casa Grande	I buy music and tracks to sing off the net. Need faster services - preferably cable, which I believe is fastest. Do desktop publisher and send projects over net - large and small. Have used high speed in Oregon - it was wonderful! Now I'm slow @ 50 kbps. Want very much high speed.
Casa Grande	I currently have a high speed connection through my employer but if that were to go away I'd be back to where I can't get my work or leisure activities done. I do a lot of online research - bill paying, consumer shopping, tutorials, etc.
Casa Grande	I currently have Broadband wireless with Netbeam out of Colorado. Service is OK, speed is OK, and price is great.
Casa Grande	I do not have speed!!! I need it desperately. I have been here 9 weeks - In KC Mo I had speed - you can see my frustration!! When are we getting Speed!!!

Casa Grande	I don't have any problems but I get impatient waiting. Also, my son may be taking class online and a faster speed would be beneficial in that case.
Casa Grande	I don't have any problems.
Casa Grande	I don't have any problems. I do not need a high speed bandwidth connection. If a high speed connection was available at no extra charge to me, then it's great. The Cox cable bill keeps going up! I didn't need any of the 9 new channels that were given to us with an added charge of $4 per month. Thinking ahead in the future, I don't need 100, 150, 200 or 500+ channels.
Casa Grande	I feel we are presently out of the loop, since we do not have access to Internet & are ill informed on important issues, new products coming out & coupon savings. I love to save money, especially since the service is not very satisfying at all. I know I could save a lot more on LD, local and LD services. I also realize that since there are not a lot of services providers for local, LD services, the prices will not come down. I'm sure with a high-speed connection, I can stop using 1 commodity or so and hopefully at a lot less cost.
Casa Grande	I get irritated with slow transfer time. I sometimes avoid upload and download of large files because of the slow transfer times. With high speed, I could do more of that, and could do things I now avoid. The analog cable TV service by Cox is very disappointing. High definition digital cable availability would be wonderful!
Casa Grande	I had Cox @Home for 5 years in Phoenix. Now dial up. Errrrr!!!! I hate it! I'll pay $40-50-60 a month for cable DSL. Please hurry!! Or I am moving back to Phoenix.
Casa Grande	I have no computer.
Casa Grande	I have no problems - high speed bandwidth would be a convenience.
Casa Grande	I have tried to get a faster Internet connection through Cox, Earthlink, Qwest, MSN, and others. As far as I can tell, no one has a faster connection for Casa Grande (If I am wrong, please let me know). It's very frustrating because it takes forever to just read my email. Even Coolidge has it with their cable - why can't Casa Grande.
Casa Grande	I inherited this infernal machine from my daughter. She had to have more sophisticated stuff. She helped me learn use of the word processor and how to send email. Beyond that, I know nothing. I hate the damn thing and will be happy when it konks out. Trouble is, she'll just give me the one she has now and get herself state of the art. All the books for dummies are no help to me. I just might buy a book for stupids.
Casa Grande	I know people in Phoenix that are very satisfied with Cox Communications for their cable Internet and telephone service. Cox upgraded their services. Also very satisfied with Cox upgrades in San Angelo, Texas. Also with Odessa, Texas. People with Cox seem very happy with the upgrades. I do believe our area is going to continue to upgrade us in Casa Grande.

Casa Grande	I look up a lot on the Internet researching travel. I also do on-line education for my travel agent job. Faster response would be great.
Casa Grande	I only use for email and pleasure. Not really very concerned about change.
Casa Grande	I probably would not subscribe to a high-speed connection because of the cost even though I would like to have one.
	I researched Casa Grande for Internet access last year, and this is what I found: The dialup connection from my residence disconnect within 5 minutes due to poor phone lines. I tried calling Qwest to see if there was something they could do, but the results weren't satisfactory and the problem remains. There are 2 high speed wireless providers in town. They operate using large local antennas situated midtown. To connect with them, however, I would need to place a 10' mast on the roof, which didn't appeal to us. (Since Casa Grande is relatively flat, these solutions don't work quite as well as Tucson and Phoenix.) As far as high speed Internet goes, the connections are relatively slow and expensive. There are 2 high speed satellite providers available anywhere in the US. One is operated by Dish Network, which is rumored to be under bankruptcy protection. The other is called DirecPC (associated with DirecTV) and we opted for their solution. There is a large equipment cost for the enormous dish, receiver, and transmitter - I believe it was around $500. Then there is a monthly fee of about $70. The streaming download bandwidth is terrific. The uplink is no better than a modem. Both suffer from a huge (.5s) latency and it only works on Windows PCs. No Macs. No Linux. This latency is a huge problem, because it has cost me 2 telecommuting positions at this point. (VPN, the gateway into corporate networks, is unworkable.) Instead, I have to drive 60+ miles to work on site which has environmental impacts as well as many personal impacts. Gas, time, care depreciation, repairs, and day care are some of the personal impacts. We estimate that it costs us approximately $1000/month for me to work on site. It would be great to see some alternative high speed Internet solutions in Pinal County, such as cable modem and DSL. We've had both at residences in Tucson and Phoenix and both had their pluses and minuses, but the cost and performance were much better than what is currently available in Casa Grande. Internet connectivity is a big part of our household. We use it daily both personally and professionally. When we purchase homes, Internet connectivity is a serious consideration. A better Internet presence in Casa Grande would go a long way to keeping us in the community for a longer period of time. I also believe, now that the southern suburbs in Phx are starting to fill up, that Internet connectivity will become more important in the community as engineers from Intel, Motorola, and Honeywell start looking at Casa Grande.
Casa Grande	I sometimes work from home. High speed Internet would make me more productive.
Casa Grande	I teach on-line classes at Central Arizona College and DSL would speed up the process. Also, I do quite a bit of on-line research and DSL would help in that area as well.

Casa Grande	I teach on-line courses. My time is often wasted because I have to wait while a site or class downloads. Streaming video and audio are nearly unbearable. I would be more productive and more efficient if I had a high-speed connection! We need high speed Internet. Right now I can't get it though I would pay for it!! I could video conference with online students too. I am also working on my online doctorate through the University of Phoenix and I need high speed for that as well.
Casa Grande	I trust this does not mean that the city and/or count are considering entering the telecom business either directly or indirectly. This would be another blow against free enterprise.
Casa Grande	I use a group investment program thru N.A.I.C. that takes several minutes to load. Faster service would really help. Current provider regularly has problems with server.
Casa Grande	I used to be on the KNA high-speed wireless system and was very satisfied with their service. Since Casa Grande Internet took over the system, I have had to regress to dial-up service at 26 kbps. On a temporary trip to the Richmond area, I had access to AT&T Cable Modem services and was very pleased with their system. On returning to Casa Grand and dial-up service, I have had very disappointing service. I have been so disgusted with the dial up service that I rarely use it. Qwest customer service is the worst I have ever dealt with. It took them nearly a month just to hook up phone service. I also prefer satellite TV service to cable service. New communities are going up quickly in Casa Grande of commuters who would rather live here than in Phoenix or Tucson. As our house was being built, I watched the utility company workers install antiquated wiring using antiquated methods. Instead of using fiber optic wiring, they used copper wires, without thought to the future. They obviously gave no thought to the communities they were building; the needs for the future demands that a place would be made for high-speed communications or even the ease of replacing the old wiring with newer fiber optic and high-speed Internet or fiber optic cable needed for cable modems. I recently heard that Cox made a deal with the reservation for the laying of a communications corridor from Phoenix to CG, but I think they wasted CG residents' time and money by installing inferior wiring in the first place. As well as Qwest, whom I have absolutely no respect for, installing old style copper wiring for phone lines, limiting users to 26 kbps modem speeds, as well as not making substations available to new communities for their DSL services, since DSL has a limited range from their substations. High speed communications are already highly feasible widely and cheaply. Since CG is so concentrated within a few square miles, free wireless (high speed) access could easily be made available to CG residents by using the San Francisco community model. They use a series of inexpensive wireless routing boxes to expand the service area off of a few T-1 lines. The city and police make use of these and subsidize the communities. There are other models available for comparisons that look like very promising prospects. They can all be made use of immediately w/o rewiring the community. To be made use of, each resident would only need to purchase a wireless router or card, get the address/pw/account of

	the system and connect.
Casa Grande	I will sign up for high speed connection on the first date it becomes available!
Casa Grande	I would appreciate a faster internet connection.
Casa Grande	I would do more research. I would visit more recreational sites. I would send and receive pictures and home movies. Anything less than 10 mg/sec would be unsatisfactory.
Casa Grande	I would enjoy the faster service but it isn't vital to me.
Casa Grande	I would like high speed cable modem capability. My family uses the Internet for education, shopping & sending pictures to family & friends in distant countries.
Casa Grande	I would use high speed connection to telecommute. Currently, I drive to Chandler every day.
Casa Grande	I would use high speed in my work as a realtor; also for surfing for info and faster access to sites used on a regular basis.
Casa Grande	I would use it same way as I use it when I had it back in Chandler.
Casa Grande	I would use the internet at home a lot more. I pay $230.00 annually and to be honest it's not worth $100.00 as is but because I use it for information and e-mail it's almost a must at home. Anything would be an improvement. PS. - If you know of a better service please let me know.
Casa Grande	I'd use the computer at home more. It takes too much time to do anything with it now.
Casa Grande	If I could combine cable, Internet, cellular, phone all in one I would if this service was offered here at a decent price.
Casa Grande	Internet provider - slow, drops off line frequently; Telephone-deregulation has caused such confusion. Probably costs more than if one company handled long distance, local, etc all in one; too many calls from all telephone co's trying to get you to switch, etc. Cable-I hate increases. Cox increases prices for what? A lot of new channels I don't use.
Casa Grande	Internet provider must connect to MSN or other carrier, and then I can access ISP. When computer is online - phone communications are interrupted because cost of additional phone service is too expensive to have. Use of one provider presently is too costly. Local area use of MSN or other provider requires LD connection to Phoenix, Tucson or Flagstaff. I am not aware of any way to circumvent that other than to use APS-Cybertrails hookup. This could be enhanced through one provider for phone, cable/DirecTV, computer, etc.
Casa Grande	It is very important for my business to have super high speed internet access ASAP!
Casa Grande	It makes it very hard to keep on top of things that I am trying to sell on Ebay. I waste a lot of time just sitting.
Casa Grande	It takes way too long to send and receive picture, music. If high speed Internet, I would use it to send pictures for my ASU Internet classes.

Casa Grande	It would be great to have an always on connection and never have to worry about busy signals or connecting. Also, the news tickers, weather updates, etc that rely on Internet connection to work. The Internet will become another household convenience, as seamless as flipping on the TV. Broadband speed reduces time searching or browsing the Net by at least 1/5th. This will reduce the frustration of waiting for pages to load and improve Internet experience overall. Plus there are a lot of services that only broadband users can take advantage of, such as being able to watch movie trailers on film.com or listening to streaming music. I can probably go on for hours, but this is a good start.
Casa Grande	It would make things a lot easier to access.
Casa Grande	It would provide a more efficient means for research and knowledge enrichment. It is disturbing that with the high growth and development in our community that we do not have economical access to high-speed internet.
Casa Grande	It's about time something was done to bring Casa Grande service up to date! I would want local, long distance, Internet to be one company. Internet is so slow I sometimes don't have time to use it. I am not satisfied with any of the above services (excluding Cox).
Casa Grande	It's sad that a community that's growing like we are does not have high speed alternatives.
Casa Grande	Just plain need High speed at a reasonable cost.
Casa Grande	Just signed up for satellite high speed because dial up is slow and unsure when & if Casa Grande will get a high speed connection.
Casa Grande	Just too slow.
Casa Grande	Keep getting bumped off Internet or delay on getting connected.
Casa Grande	Keep getting kicked off and have to re-connect. So, so slow. Dial-up is a dinosaur.
Casa Grande	Less time on Internet because of having to wait. After already having both cable and DSL Broadband it's hard to go back to dial-up. I don't even try to listen to music online or download any videos.
Casa Grande	Let's put it simply! We moved 1 year ago from New Hampshire. We had AT&T Broadband: TV, phone, Internet. It was cheaper than current by big $$. Need I say more?
Casa Grande	Local phone provider bill - taxes and other charges equal or exceed the cost of service. Cancelled Sprint cell phone service because would not work in my home. Cancelled LD provider because taxes and misc charges exceeded minute called charge.
Casa Grande	Local provider cannot get the bill correct for my 3 lines. I have been mischarged on several different occasions - am on the phone with them for an hour. Next bill is then wrong in a different, new way and we start all over again. Different people I talk to tell me different things ("you should be on this plan"). I agree but the bill is sure to be wrong. They will & have taken off overcharges, but it keeps happening so I have to watch that bill "like a hawk." Very frustrating!

Casa Grande	Makes attending distance learning classes difficult.
Casa Grande	Most URL's presume you have high speed and have a large amount of data just to look at the site.
Casa Grande	Mother-in-law has restricted lung disease. She uses Internet for looking up information. 3 children, one in Junior HS, - they will use for school education/research. Would like a faster Internet connection for everyday use.
Casa Grande	Much time is wasted due to slow connection and download in my present arrangement. Often I have to postpone using the Internet when I would like to check something quickly because I don't have the extra time at the moment. We are a growing community and need to move into the 21st century!
Casa Grande	My biggest complaint is that I keep getting cut off because of the meter system. When I talk to hem and state that I have unmetered, unlimited service, I get the run-a-round. I do a fair amount of web research. At 16 kbps downloading is a real pain. The problem for the slowness - old telephone lines. The phone company will not replace the old line with fiber optic line. Please keep me informed. I'm interested.
Casa Grande	My family has a high speed connection, but the costs are very high. The transfer rate is only 384 kbps, which is slower than most DSL and cable connections. A high speed Internet connection is very valuable to me as I am on the Internet every single day. I mostly use the high speed Internet for games.
Casa Grande	My grandkids live on the east coast - downloading pictures takes a very long time. I connect at 28.8. I research ICS/DOL/Az State for work - it takes too long. Certain games I play online must have high speed - cannot play them. I buy on eBay - last minute bidding is impossible because of slow speeds. I cannot play music due to slow speeds. I cannot multi-task. I usually receive error messages or lose my connection.
Casa Grande	My major issue is having to deal with so many providers and bills to get the service I need at a reasonable price. Especially when several have the capacity to do all or most of it. It is either cost prohibitive or they do not offer the things I need. I would probably use the phone system for communication, fax for business and my wife's medical needs, the Internet for medical and education information.
Casa Grande	Need high speed for downloading pictures, financials, stock market, downloading with present system is terrible. Need high speed & reasonable cost.
Casa Grande	Never connect faster than 26.6K
Casa Grande	No problems with what I have.
Casa Grande	None
Casa Grande	Not needed.
Casa Grande	Not really interested.
Casa Grande	Our bill has been constantly in error since May 2003 when we ordered a Qwest cellular phone. Problems of billing errors still not resolved with August 2003 bill. We had SBC/Ameritech in Wisconsin & never had a problem & phone answerers were POLITE.

Casa Grande	Our current internet provider is way too slow and we get kicked off a lot. It is very frustrating. I can leave the room and get other things done while things get downloaded. I usually get hooked online with half the speed.
Casa Grande	Phone wires in area are old and brittle causing internet speed of 24K instead of the 56K we should be getting. Other internet options for high speed are too expensive here (catering to the rich only) We get disconnected in the middle of things because it takes forever to search and find. Downloads take hours or days when we are continually disconnected or the phone lines are slow. With the phone lines as the culprit for the slow speed, we are running at less than half the speed we should be. Please try to get them fixed (phone lines) so that everyone will have a more enjoyable surfing experience. Sometimes - mostly it is like living in the 3rd world here.
Casa Grande	Problems: outages, busy lines. Don't know a lot about high speed but banking, shopping.
Casa Grande	Providers offer so DSL in area (Qwest or Cox). Without DSL, it takes so long for connection. I would be on the computer much more with DSL. It would make things much simpler.
Casa Grande	Qwest- extremely poor customer service. I would jump at the chance to change local phone service provider. AOL-service is just fine, but very slow speed. We use it for surfing and general ed/e-mail so it's not critical for us.
Casa Grande	Qwest phone charges are TOO high. Cox cable quality is poor and basic service costs too much -no change in service with last rate hike -- only benefited premium services. Cities mislead public in approving rate hike that didn't benefit basic plan (lowest plan).
Casa Grande	Qwest telephone/cellular service is the worst in the country. Every month the billing is questionable. MSN is very slow. Cox is not able to provide what other companies can.
Casa Grande	Qwest: have experienced numerous interruptions in the telephone service of 24 hours or more.
Casa Grande	Research/data transfer
Casa Grande	Slow
Casa Grande	Slow connection; occasionally cannot get connected.
Casa Grande	Slow downloads, getting bumped off. It would assist in downloads for school research.
Casa Grande	Slow ISP -Internet activities.
Casa Grande	Slow service. We recently relocated to CG from Tempe and were very disappointed that there is no high speed service available.
Casa Grande	Sometimes we cannot get online with our current internet provider and it is happening more and more. Gets very frustrating. Would like to have Cox wireless but it is not available in our area yet. Don't want to pay more than $40 a month for it though. Wouldn't be worth it.

Casa Grande	Speed limited to 28.8k by Qwest on dial-up. After having ADSL at my prior location, this was a major adjustment making my Internet experience less pleasurable due to the slow speed. The data transmission speed would increase pleasure of using the Net and increase productivity.
Casa Grande	Studying on-line is not so comfortable with dial-up. Downloading big files like updates for programs & educational related files are very time consuming. I will use high-speed Internet for these and also for research issue.
Casa Grande	Surfing web.
Casa Grande	Takes hours to download important data. Would like to have phone access while connected to the internet.
Casa Grande	Takes longer for pages to load; at high use times, sometimes I can't get online. If I plug my phone line in for the satellite, it slows down my connection - way down. At work we are "automatically" connected through a network - I can see the difference - much smoother. Thank you.
Casa Grande	The business of toady wants you to use online shopping and information gathering. It's easier and faster for both end cost & business. Colleges are going more to online classes and a slow connection is not a good thing. I use Netbeam (wireless) because it is the only choice I have in Casa Grande and it's not cheap but it works for now. I am lucky I can afford it. Most people can't and everyone should be able to have access to it at a fair price.
Casa Grande	The main issue is loading time. Sending is also slow at times, but not horribly slow.
Casa Grande	There are many problems associated with NOT having high speed connections. First, I have to have a phone line for dial-up which brings along with it those annoying telemarketer phone calls. I currently only have a phone line for the Internet. (2) Without high-speed connections, many sites time out, can't connect, or I can't get the connection necessary to access certain sites. (3) Forget about downloading anything. It takes hours to do so and a lot of times there are problems trying to download, causing you to have to try 3 or 4 times before getting it. Dial-up is too slow to be productive in the telecom world today. High-speed connections would rectify or improve all of these problems and would allow me to properly use the Internet and more effectively transfer and receive data for both school and business. I will also be able to email, surf the web, and do my e-commerce over the web in a timelier manner. I really hope I am able to get high-speed connections soon!
Casa Grande	They charge ridiculous fees. Internet is slow, prices are unsatisfactory.
Casa Grande	Trouble connecting into internet -slow (painfully) connections, data transfers, email difficult to access w/o going through 3-4 steps.
Casa Grande	Very expensive. Thru our Satellite provider. It is not offered in our area thru cable service provider - which is a lot more cost efficient (reasonable) $39.99/month - cable, compared to $99.99 /month for 1 year after a large 1st payments - satellite - It will then go down to 59.99/month.

Casa Grande	Very satisfied!
Casa Grande	Very slow connection speeds 28.8 or 24.4. We had Cox High Speed Internet; also we lived in Chandler, very good services and value for the dollar. Use it for business as well as research and surfing.
Casa Grande	Waiting too long to get e-mail, research & info.
Casa Grande	Waste time waiting to connect.
Casa Grande	We are always getting disconnected in the middle of using the internet. We also have trouble getting connected.
Casa Grande	We are currently receiving all services from Phoenix area & additional charges are made to receive services. Local services would be very appreciated. Is there any way to add security system monitoring to this service being developed?
Casa Grande	We are not in line with the antenna and could not get the high speed, wireless connection. I would like high speed to save time on the computer.
Casa Grande	We are very much anticipating high-speed Internet service. This would enable me to telecommute in the near future. My employer is soon embarking on a pilot program to make this opportunity available to those with high-speed access.
Casa Grande	We currently have to copy files that are too large onto a CD. Then we send them via Fed-Ex instead of just sending it via e-mail.
Casa Grande	We have constant disconnections with our Internet provider and would rather have high-speed.
Casa Grande	We need more phone towers for cellular service. Most providers do not work at my house.
Casa Grande	We want Cox high speed internet!! Or any high speed cable another service for that matter but Cox is best.
Casa Grande	We will be moving to AZ City which doesn't have high-speed Internet. Casa Grande only has a couple at best & they are expensive. Cox cable should have had digital cable and Internet but it doesn't. Coolidge & Florence don't have the population Casa Grande does and they have digital cable & Internet. The phone lines in CG are out of date. It's like we live in the 1970s or something. More rural areas like Eloy, Toltec & AZ City are much worse than CG with regards to getting anything more up to date as far as phone, cable & the Internet goes. Cox cable doesn't even have pay-per-view. That's why we cancelled Cox Cable - because of their lousy service. It's not fair to see all the commercials for digital cable and Internet for Phoenix and we can't get them.
Casa Grande	We wish there is a local provider offering various services under one roof aside from Qwest. There must be a competitor to Qwest and we would support such competitor. Qwest is all the time overcharging and the phone is fabricated to charges that are irrelevant such as busy tone voice mail.

Casa Grande	With dial-up service, the high graphic content of present day Internet sites is a drag on time. Fully 1/2 to 2/3 of time on Internet is waiting for pages to load. E-bay is a good example. Transfer of photos to family and friends is slow enough that we haven't purchased a digital camera. Same old computer story: you always want more storage, faster processing speed, later monitors, and neater software.
Casa Grande	With several computers, kids and people doing work, banking, and research. Slow speeds make it hard. I do currently on the waiting list for DSL with Earthlink.
Casa Grande	Working from home on occasion it makes it difficult to perform simple tasks thru a limited signal. My job depends on high speed service. If I can not accomplish a simple task in a short time frame, I might as will drive to my office (45 min away) and still finish quicker than at home. I am an internal corporate auditor.
Casa Grande	Would like to have the same service offered in Scottsdale - i.e. telephone local & long distance plus internet access via Cox (or any provider w/ same service)
Casa Grande	Would love High Speed Capability to choice of land phone service. Have nothing good to say about Qwest. But not willing to go completely cell. They have monopoly and I would not be using them if not have too.
Casa Grande	Yes, I would like to know what issues my current providers may have. The problems I'm having are not being able to connect, getting disconnected, slow speed downloading and slow downloading emails. My old provider (MSN) - everything was slow as well, besides that, I wouldn't get some of my emails. Also, when I would get attachments with my MSN email, I couldn't open them. That's why I cancelled my MSN and went to Wal-Mart connect. I would use it for emails, surfing and research, educational and work.
Dudleyville	We have problems with our local & long distance phone company. Qwest, poor service. Cable co, Eagle West, was so bad I went to satellite.
Eloy	Data transfer is important! We are at a competitive disadvantage because of our usage of dial-up.
Eloy	For personal research/recreation. Hopefully you will not go the route with this that you have with the water.
Eloy	Get kicked off very often.
Eloy	I don't have any of the above and don't plan to ever have. I use prepaid phone card for long distance service. I live on a fixed income, can't afford this. Don't need it so don't add to my bill.
Eloy	More cable stations, faster internet, faster download, faster email
Eloy	My present computer is accessing the internet through a 56K modem. Due to "your" present phone lines, my modem operates at 33K max. With updated lines, my modem would operate at a higher baud rate. Downloads are long and slow. With three college students, the internet has become an important part of our every day lives. With a faster communication system there would be less time on the internet and more time spent as a family. Thanks for listening.
Eloy	No importance personally or professionally

Eloy	Once on line, I get disconnected frequently (4-5 times an hour). I would love to switch but on fixed income I can't afford it.
Eloy	Qwest provides poor service, poor products and shows little concern. Hard to get reliable, efficient internet service.
Eloy	School research/downloads/updating computer/surfing net
Eloy	Tele-medicine. It would be of great benefit and less frustration to have internet service that would stay connected. Trying to access information at home is very difficult as internet service is slow, unpredictable and often disconnects before finding a site needed.
Eloy	The name "QWEST" says it all. My connection speed never exceeds 33,000 BPS although I have the latest modem upgrade.
Eloy	To keep in touch.
Eloy	Work at CAC in Research and not able to download and upload some files as it takes forever- lines so slow!
Florence	Desirable - not essential.
Florence	I don't use my internet on a daily basis so I am satisfied with what I have. Our phone lines at present aren't capable of high speed internet.
Florence	My wife is taking college courses with much of the assignments online. I would just like to be able to call up web sites at a faster rate. Honestly, however, I don't know how much more I'd be willing to pay for the convenience. What I'm most unhappy with is the poor cable service and the ridiculous long distance services. Right now, we use cell phones or calling cards to cover what little long distance calls we make. Why can't someone come up with a smorgasbord of phone/internet/cable service where I can pay one bill instead of 4?
Florence	Need more training than is provided. Haven't used the internet yet.
Florence	No problems - Again, should not have to pay more for a better "service?" replacement.
Florence	Qwest line drops callers and internet all the time. Very bad service from Qwest.
Florence	Request too much personal info.
Florence	Take on-line courses.
Florence	Takes a long time to download. Faster downloads.
Florence	We live outside the Florence town limits. We don't have cable at all! Our choices are none. I have been answering every pop up ad and calling every commercial phone number to see about high speed internet. We can't even get this through a satellite dish! Casa Grande Internet has recently gotten high speed internet, but no one without a business can get it! When you are one of their customers and they won't share, that is rotten!
Florence	Would connect to county AS400. Current cable TV has only 30% clear channels, many outages and only

	AMC.
Kearny	I am unhappy because I have DSL but it is slow and I cannot get the provider on line or on the phone when there is a problem. I want a company I can rely on and also one that gives me a faster DSL.
Kearny	I go to the library for internet access. It takes forever to connect to the internet and it is hard to stay connected. Everybody in this area has a lot of trouble getting kicked off line when we are right in the middle of important business.
Kearny	Problems are that having to wait for information because service is so slow or becomes jammed. Would like to see faster internet service to keep up with job searches, & research.
Kearny	Problems are that internet is too slow. Can't do as much research for jobs, schools etc. within the 30 minutes allocated with service too slow. Would use high speed internet to get needed information faster and quicker.
Kearny	Slow; Down a lot; cost without service
Kearny	Too slow, cutting out, being kicked off.
Oracle	I am constantly being disconnected-invariably after only five or six minutes inactive. Often I do not have sufficient time to read and answer an e-mail message before I am disconnected. Sometimes I am disconnected right while downloading email and while downloading software from the web. It is often impossible to the on line. For example today I have not been able to make the connection to the service provider after repeated efforts for the past twelve hours. And the Service provider is not even answering their phone.
Oracle	I have recently moved to the community and don't have internet connection. I know it will have to be through a phone line and I would like to have a faster connection.
Oracle	If I had high-speed, I could download software, do my research quicker and my e-banking more reliably. I could get rid of Qwest's low quality line and stay online.
Oracle	Maintaining my wife's websites is time consuming due to slow connection speed. Slow connection speed hampers my e-commerce business. Unable to download large files.
Oracle	Our family would use the Internet more for education and research! It is so slow we give up.
Oracle	Satellite TV doesn't offer Tucson local channels because of the area code. Need Tucson channels!!
Oracle	We experience knowing better services and fuller service are available. However, we have not used such and cannot properly identify how important these are to us. We would like to have the best that communications technology can offer as the standard of life and over-all capacity for awareness/education/information increases with exposure-we believe.
Queen Creek	I do not have high speed internet but the speed of my current service is acceptable. I cannot afford the high speed right now.

Queen Creek	I work from home 1 day per week and need good online speed. My dial-up connection speed is unsatisfactory. I found this survey by accident. Why was there no outreach to residents? And do fillable online form? This fax is a long-distance charge.
San Manuel	I supplement my internet speed on dial-up with a program called Treakmaster Pro; I am able to run at a comparable speed as my work connection (100k). Connecting constantly at 48 kbps or better is my only complaint-sometimes I have to re-dial 2 or 3 times.
San Manuel	My home phone seems to be ok. The internet is dial-up and is very slow. My cell is through Alltel and the connection is poor, most areas are dead. There is no service at all from the city limits of San Manuel through all of mammoth and half way to Oracle. I don't have long distance at home because I have free long distance on my cell. The cable company in our area has outdated programming, few channels and they have a lot of trouble with equipment, poor reception, no Disney channel. Offers some channels in one area and not in others. When a channel goes out, they just replace it with something else rather than make needed repairs.
Stanfield	Ties up phone line and the rest I don't care about. I look at the computer enough at work. I don't use it at home.
Toltec	Doing OK but faster is better.
Toltec	Get disconnected a lot - every five minutes.
Toltec	Research faster
Toltec	The connection always is lost. It is an all day process just to get through checking email.
Toltec	We do not use our computer for on-line games, music or chat rooms. We also don't use our computer for any business purpose. It is always nice to have faster connections however in our case it really isn't an issue.

APPENDIX D – DATABASES

APPENDIX E – EDUCATION

- Arizona Cyberschool Legislation
- Qwest and County
- County/Higher Ed Comments
- SACCNet

ARIZONA "CYBERSCHOOL" LEGISLATION

HB2093 - (NOW: distance learning; technology assisted program): *Representative Linda Gray*

Requires pupils enrolled in the Technology Assisted Project Based Instruction Program (TAPBI) to be subject to testing requirements, and students who fail to meet testing requirements may not be able to participate in the Program the following year, unless more than 95% of the pupils have been tested. HB 2093 ensures that pupils in the Program were previously enrolled in a public school in the state, and allows kindergartners who have a sibling already enrolled in the Program to be eligible to participate. Additionally, the bill requires the Superintendent of Public Instruction to evaluate all nationally standardized norm-reference achievement tests offered in kindergarten and grade one, and may make a recommendation for a K-1 test for the Program, which schools may choose to administer. Finally, HB 2093 creates the Joint Select Committee on Technology Assisted Learning, which is repealed December 31, 2003, and adds an Emergency Clause.
05/20 - SIGNED BY GOVERNOR. Chap. 241, 2003 Laws.

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15-808. Technology assisted project-based instruction program; report
http://www.azleg.state.az.us/ars/15/00808.htm

A. A technology assisted project-based instruction program shall be instituted on a pilot basis to meet the needs of pupils in the information age. Until June 30, 2003, the state board of education shall select up to four existing traditional public schools, at least one of which shall serve pupils in kindergarten programs and grades one through twelve, and beginning July 1, 2003, the state board of education shall select seven existing traditional public schools and the state board for charter schools shall select seven charter schools to participate in the program based on the following criteria:

1. The depth and breadth of curriculum choices.

2. The variety of educational methodologies employed by the school and the means of addressing the unique needs and learning styles of targeted pupil populations including computer assisted learning systems, virtual classrooms, virtual laboratories, electronic field trips, electronic mail, virtual tutoring, on-line help desk, group chat sessions and non-computer based activities performed under the direction of a certificated teacher.

3. The availability of an intranet or private network to safeguard pupils against predatory and pornographic elements of the internet.

4. The availability of filtered research access to the internet.

5. The availability of private individual electronic mail between pupils, teachers, administrators and parents in order to protect the confidentiality of pupil records and

information.

6. The availability of broadcast quality television production and editing facilities on campus.

7. The availability of faculty members who are experienced in broadcast television production.

8. The availability of faculty members who are experienced with computer networks, the internet and computer animation.

9. The extent to which the school intends to develop partnerships with universities, community colleges and private businesses.

10. The services offered to developmentally disabled populations.

11. The grade levels that will be served by the program.

B. Beginning July 1, 2003, notwithstanding subsection A of this section, any school that was approved to participate before January 1, 2003 is not required to reapply for participation in the program. A pupil is not eligible to participate in the program unless the pupil was previously enrolled in and attended a public school in the previous school year, except that a kindergarten pupil may participate in the program if the pupil has a sibling who is currently enrolled in and attending the program. Pupils who participate in the program are subject to the testing requirements prescribed in chapter 7, article 3 of this title. Upon enrollment, the school shall notify the parents or guardians of the pupil of the state testing requirements. If a pupil fails to comply with the testing requirements and the school administers the tests pursuant to this subsection to less than ninety-five per cent of the pupils in the program, the pupil shall not be allowed to participate in the program.

C. Each school selected by the state board of education to participate in the technology assisted project-based instruction program shall submit an annual report to the state board of education and the joint legislative budget committee. Beginning July 1, 2003, each school selected by the state board for charter schools to participate in the technology assisted project-based instruction program shall submit an annual report to the state board for charter schools and the joint legislative budget committee. The reports shall be submitted by August 1 and shall include the following information:

1. A description of the educational services that are offered under the program and that specifically relate to the depth and breadth of the curriculum choices offered by the school.

2. A description of the effects of media and technology on the delivery of specific educational services to specific pupil populations.

3. A measurement of academic achievement of pupils in the programs, including academic advancement as measured by the increase in grade level equivalent scores each academic year on the nationally standardized norm-referenced achievement test prescribed in section 15-741 and a summary of essential skills test scores, scores on the nationally standardized norm-referenced achievement test, individual pupil portfolios and other assessment tools used by the school. The superintendent of public instruction shall evaluate current nationally standardized norm-referenced achievement tests offered to pupils in kindergarten and grade one. The evaluation shall include the impact on the pupils, the costs associated with each test and the academic value associated with each test. The superintendent of public instruction may recommend at least one nationally standardized norm-referenced achievement test for schools participating in the program pursuant to this section to be offered to pupils. Each participating school may offer this test to its pupils and if the test is offered, each participating school shall be responsible for the costs of administering the standardized norm-referenced achievement test to pupils in kindergarten programs and grade one. Each participating school shall analyze the results of the standardized norm-referenced achievement tests administered to pupils in kindergarten programs and grade one.

4. Academic advancement as measured in grade level equivalents each academic year based on a standardized norm-referenced achievement test.

5. The results of a survey of pupil satisfaction with the program, including:
   (a) Pupils' attitudes about delivery modalities employed by the school.
   (b) Changes in pupils' attitudes toward learning in general.
   (c) Changes in pupils' attitudes about their own ability to learn and about their own academic progress.
   (d) Pupils' attitudes about the school they attend.

6. The results of a survey of parental satisfaction with the program, including:
   (a) Parents' and their children's attitudes about the delivery modalities employed by the school.
   (b) Changes in their children's attitudes about learning in general.
   (c) Changes in their children's attitudes about their ability to learn and about their academic progress.
   (d) Parents' and their children's attitudes about the school that the child attends.

7. A description of the availability and equitable distribution of educational services provided under the program including specific descriptions of the effectiveness of technology tools and modalities used to address the needs of any underserved populations targeted by the school.

8. A description of the operational and administrative efficiency of the program.

9. A description of the cost-effectiveness of the program.

D. The state board of education and joint legislative budget committee shall collaboratively compile and evaluate the information submitted in the annual reports by schools participating in the pilot program, pursuant to subsection C of this section. The state board of education and the joint legislative budget committee shall report their findings to the governor, the speaker of the House of Representatives and the president of the senate by November 15 of each year.

E. Each school selected for the technology assisted project-based instruction program shall ensure that a daily log is maintained for each pupil who participates in the program. The daily log shall describe the amount of time spent by each pupil participating in the program pursuant to this section on academic tasks. The daily log shall be used by the school district or charter school to qualify the pupils who participate in the program in the school's average daily attendance calculations pursuant to section 15-901.

F. If a pupil is enrolled in a school district or charter school and also participates in the technology assisted project-based instruction program, the sum of the average daily membership, which includes enrollment as prescribed in section 15-901, subsection A, paragraph 2, subdivisions (a) and (b) and daily attendance as prescribed in section 15-901, subsection A, paragraph 6, for that pupil in the school district or charter school and in the technology assisted project-based instruction program shall not exceed 1.0. If the pupil is enrolled in a school district or a charter school and also participates in the technology assisted project-based instruction program and the sum of the daily membership or daily attendance for that pupil is greater than 1.0, the sum shall be reduced to 1.0 and shall be apportioned between the school district or charter school and the technology assisted project-based instruction program based on the percentage of total time that the pupil is enrolled or in attendance in the school district or charter school and the technology assisted project-based instruction program. The uniform system of financial records shall include guidelines for the apportionment of the pupil enrollment and attendance as provided in this subsection.

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House of Representatives
HB 2093
technology assisted pilot program; repeal
http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/legtext/46leg/1r/summary/h%2Ehb2093%5F05%2D22%2D03%5Fastransmittedtogovernor%2Edoc%2Ehtm&DocType=S

(NOW: distance learning; technology assisted program)

Sponsor: Representative Gray L

HB 2093 requires pupils enrolled in the Technology Assisted Project Based Instruction Program (TAPBI) to be subject to testing requirements, and students who fail to meet testing requirements may not be able to participate in the Program the following year, unless more than 95% of the pupils have been tested. HB 2093 ensures that pupils in the Program were previously enrolled in a public school in the state, and allows kindergartners who have a sibling already enrolled in the Program to be eligible to participate. Additionally, the bill requires the Superintendent of Public

Instruction to evaluate all nationally standardized norm-reference achievement tests offered in kindergarten and grade one, and may make a recommendation for a K-1 test for the Program, which schools may choose to administer. Finally, HB 2093 creates the Joint Select Committee on Technology Assisted Learning, which is repealed December 31, 2003, and adds an Emergency Clause.

History

The TAPBI Program was established by Laws 1998, Chapter 224. Two school districts and two charter schools participate in the TAPBI Program: Deer Valley Unified, Mesa Unified, PPEP TEC Charter School and Sequoia Choice Charter School.

A.R.S Section 15-808 requires each school selected to participate in the TAPBI Program to submit an annual report to the State Board of Education (SBE) and the Joint Legislative Budget Committee (JLBC) by June 30 that includes the following information:

- A description of the educational services that are offered under the Program.
- A description of the effects of media and technology on the delivery of specific educational services to specific pupil populations.
- A measurement of academic achievement of pupils in the programs.
- Academic advancement as measured in grade level equivalents each academic year based on a standardized norm-referenced achievement test.
- The results of a pupil satisfaction survey.
- The results of a parental satisfaction survey.
- A description of the availability and equitable distribution of educational services provided.
- A description of the operational and administrative efficiency of the Program.
- A description of the cost-effectiveness.

A 2002 study conducted by the SBE and the JLBC found that TAPBI Program sites were not reporting standardized test scores data for program participants as stipulated in statute. It was found that this was due to the fact many students only participate in TAPBI courses for one year, so year-to-year academic progress was not measurable. Further, most TAPBI students are enrolled in both TAPBI and non-TAPBI courses in the same year, therefore their annual academic progress, as determined for TAPBI courses only, could not be determined. Current law limits the number of participating students within the state to 500.

Provisions

- Requires the SBE to select seven traditional public schools to participate in the Program.
- States that the State Board for Charter Schools must select seven charter schools to participate in the Program.
- States that any school that was approved to participate in the Program before July 1, 2003 is not required to reapply.
- Stipulates that pupils who participate in the TAPBI Program are subject to current statutory testing requirements and if the requirements are not met the pupil will be prohibited from participating in the TAPBI Program, unless 95% of pupils in the program meet the testing requirements.
- Ensures that pupils in the Program were previously enrolled in a public school in the state.
- Allows kindergartners who have a sibling already enrolled in the Program to be eligible to participate.
- Specifies that upon a pupil's enrollment the school must inform the parent or guardian of the state testing requirements.
- Stipulates that by August 1 each school selected by the State Board for Charter Schools to participate in the Program must submit an annual report to the State Board for Charter Schools and Joint Legislative Budget Committee.
- Changes the date from June 30 to August 1 by which schools that participate in the TAPBI Program must submit an annual report to the Legislature.
- Requires the Superintendent of Public Instruction to evaluate all nationally standardized norm-reference achievement tests offered in kindergarten and grade one, and may make a recommendation for a K-1 test for the Program, which schools may choose to administer. Each school that chooses to administer the K-1 test is responsible for all costs.
- Creates the 11-member Joint Select Committee on Technology Assisted Learning responsible for:
- Identifying the best practices to technology assisted learning programs throughout the United States.
- Preparing a cost analysis of similar programs throughout the United States.
- Studying the feasibility of the expansion of technology assisted learning programs in this state.

- Presenting a report on the Committee's findings and recommendations to the Legislature.
- Repeals that Committee after December 31, 2003.
- Contains and emergency clause.

· ---------- DOCUMENT FOOTER ---------

· 46th Legislature

· First Regular Session 3 May 22, 2003

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· ---------- DOCUMENT FOOTER ---------

QWEST CAPABILITIES OFFERED TO THE COUNTY CUSTOMERS

- **Network Consulting:** Qwest provides the networking expertise of engineering personnel to design, implement and maintain the schools complex networks. These consultants can help schools challenging network issues such as network architecture, performance optimization, traffic analysis, and security concerns.
- **Design and Architecture**
  This service aids the County schools with the design and planning of a new network or the revision of an existing network. QWEST System Engineers can help provide efficient network designs, strategic recommendations, and long-range plans to meet the County school's technical and communication requirements.
- **Project Management:** For the coordination of large or complex networking projects, Qwest provides project management services. These services enable the County schools to concentrate on larger issues while QWEST handles the details of project implementation. Project management support ensures the smooth and timely completion of your key projects.
- **Project Implementation**
  Qwest will provide staff to implement school requirement to correct deficiencies or improve the Information Technology infrastructure of all schools throughout Arizona. Including the expansion of broadband services to connect to the Internet.
- **Equipment Acquisition**
  Some County projects require Qwest personnel to coordinate the ordering and acquisition of equipment, telephone circuits or other materials. This may include developing project specifications, determining quantities, placing orders, and arranging for delivery and installation. Project Management service assure adherence to the equipment requirements.
- **Staging/Deployment/Transition Planning**
  Using proven project management techniques, Qwest personnel will prepare school projects for smooth deployment. This will help to ensure that required equipment and technical staff are ready to proceed at the appropriate milestones. Additionally, to help ensure a trouble-free transition, Project Management staff can develop plans to accommodate the individual requirements of effected personnel.
- **Status and Progress Reporting**
  Qwest will ensure that school's project managers are kept up-to-date on the progress of the project. In this way, the project can move forward smoothly while keeping surprises and problems to a minimum. As required, this may include regular status meetings, emails, status reports, charts/graphs, and/or conference calls.
- **Contingency Planning/Problem Resolution**
  In large and complex projects, unanticipated issues may arise. If requested, Qwest can develop backup options and contingencies plans. By taking this extra step, disruptions can be avoided, downtime minimized and frustrations reduced.
- **Infrastructure Management**
  Qwest provides experienced personnel to consult on the management of existing networks and assure installation of new networks. This service provides an effective manner in which to handle the ongoing operation of large and complex networks.
- **Network Security Issues**
  Network security has become a critical concern for most schools. Arizona schools

now rely heavily on their networks as a communication mechanism, a repository for important documents, and a major source of educational material. As a result, threats from hackers, viruses, and catastrophic mishaps can unexpectedly damage a business' ability to operate. QWEST personnel can help schools enhance their networks with security appraisals and security programs.

- **Problem Diagnosis and Resolution**
  Networks develop problems. Whether because of hardware or software failures, capacity issues, or new applications—problems are inevitable. However, if network problems develop, Qwest personnel are available to help determine the cause of the problems, resolve them, and quickly have a school district's network operational again. In addition to resolving problems, System Engineers can make recommendations that will improve the performance of networks.
- **Performance Optimization**
  Most networks work well when originally designed and installed. However, network speed and functionality may degrade when, for example, additional people are added to the network, Internet access is provided, email systems are installed, or voice response systems are developed. To help schools assess the operation and improve the performance of their networks, System Engineers can review traffic volumes, determine bottlenecks, appraise segmentation patterns, and review the functionality of existing equipment.
- **Traffic Analysis and Auditing Services**
  A performance baseline and product inventory are important tools that can be used to evaluate the current and future performance of a network. After gathering traffic data and inventorying key communication links, Qwest's technical staff can evaluate the information and provide recommendations for network tuning or modifications. Often, the results of a traffic analysis or network audit can uncover bottlenecks, network design flaws, or outmoded technology. Further, the data gathered might be used as the basis for recommendations that can improve the capabilities and performance of a school's network.
- **Network Management System Design**
  Keeping a network running smoothly can be facilitated with network management systems. Such systems can monitor key network functions, anticipate problems, and better plan for future expansions. System Engineer consultants can work with schools to design and implement a management system that provides a high level of functionality and enhances network operations.

COUNTY/HIGHER ED COMMENTS

“Qwest [Students FIRST] equipment was out of warranty before it was installed.”
-- a Gila County School District

"Availability is not the problem, cost is. We need more ISP providers."
-- a Gila County School District

"St. Charles School is in the second year of the e-rate grant. Our original service provider to install stage one of the grant was Cybertrails. They gave us good service. We however had great difficulty because Qwest would not free a T-1 line. They gave their last line to Circle K, even when they knew of our request. Cybertrails tried to negotiate for us as an educational institution but they wouldn't change it. We had to submit our grant changing from T-1 to DSL. We also changed our service provider in order to have Apache Telecommunications lay the DSL line for us. They are and have been very helpful. We do not have a person on the staff presently who knows a great deal about all the possibilities of the current technology. This limits what we have been able to implement. We are a small Catholic school with limited funds. We would not have the technology we presently have if it was not for private donations, Federal Title I grant money, and the e-rate grant. A technology coordinator and trouble shooter is an urgent need."
-- a Gila County Parochial School

"We currently have satellite service [512Kbs]. We are working to make it faster, but if it doesn't, we want to pursue a T-1 service that is currently being looked at through our telephone company. Currently, when students are on line with a project in the lab, it is with a limited time. Slow access makes that time go by very quickly. We are signed on with COXEDNET which contains great sites for students (Typing Pal and AIMES) but doesn't get used because of the slow access."
-- a Gila County School District

"Qwest needs to complete the fiber loop to the valley so Payson is not limited or handicapped by the Mt. Ord microwave repeater."
-- a Gila County School District

"I would like to have more bandwidth available. The installation of T3 lines would provide more bandwidth. The installation of a SONET backbone would provide more bandwidth. The potential for greater economic development would be a benefit of more bandwidth. Call centers and other data storage providers would have a reliable workforce locally."
--a Gila County School District

"Casa Grande does not have digital phone service which would be good to have. Other alternate high-speed connection providers would help provide better bargaining power to the end user."
-- a Pinal County School District

"Phone system is unavailable and crashes often. Service is lacking. Cox seems to want new customers in the Phoenix are and isn't interested in our area."
-- *a Pinal County School District*

"Cox Education Network resource is great but slows down when using video streaming technology because we have a T-1 Internet connection."
-- *a Pinal County school district*

"Because of the LATA's setup in Arizona, in order to have a T-1 circuit to other schools within our joint Vocational School District, a dedicated T-1 circuit for interactive TV between Superior and Globe would cost approximately $6,260/year. The Circuit would be routed from Superior to Apache Junction to Tucson then to Globe. Superior is only 18 miles from Globe."
-- *Superior School District*

"E-rate is very important in maintaining a broadband connection to the Internet. Would hate to see what would happen if this funding source dries up. Maintenance contracts are important to us for our Internet, network and telecom services but they're so expensive."
-- *Pinal County school district*

"We currently have [high] speed internet access. One of the most difficult problems to deal with is the cost of the servicing our technology equipment along with network problems. We have already spent $11,000 to this point [November] in the school year."
-- *Pinal County school district*

"We have built our own high speed network, largely because there was no high-speed access available. Qwest has been unresponsive and unwilling to offer service. No cable company has expressed interest in offering services. Common carriers have been unwilling or unable to erase the LATA so we can link all of our campuses."
-- *Central Arizona College*

Southern Arizona Communication Consortium Network (SACCNet)

Graham County Board of Supervisors
Jim Palmer (Chairman)
Mark Herrington
Drew John
County Manager
Terry Cooper
Information Technology Director
John C. Lucas

What is it all about!

- Connecting Southern Arizona Counties to Phx/State of Arizona through County Supervisors Association (C.S.A.)
  - Cochise
  - Gila
  - Graham
  - Greenlee
  - Pima
  - Pinal
  - Santa Cruz

How is it to be done?

- **Use of Leased Telco Provided Fiber Lines**
- **Muxing Technology converting Fiber to multiple 1Gib Channels**
  - **Creation of (12) 1Gig Channels from (3) Stands of Fiber**
- **Daisy Chaining of Fiber between County Seats and CSA**
- **Redundant Microwave Link from Graham County to CSA(Phx)**

We Propose That The (12) 1Gig Channels Be Utilized as Follows:

- (7) County/State Services Link
- (1) Justice Network (Arizona Office of the Courts/DPS)
- (1) Communication Net
Emergency Services /Homeland Defense
Video Conferencing (i.e. Town Halls from Phoenix.)
County-County Video Conferencing (example: distance learning labs, telemedicine, etc.)
Intranet between agencies
State-Wide Fund Accounting System
- (1) State/State Link (ADOT, ADOC, DMV, DES, etc)
- (1) Federal Link (Federal Agencies)
- (1) Community Net (Internet, Education, Open forum)

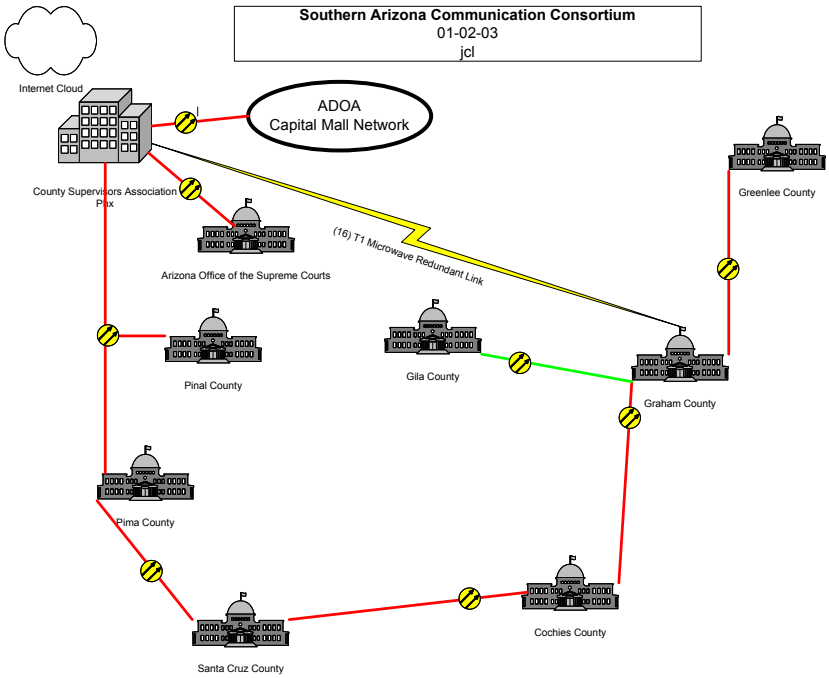
Why Connect?

- High Speed Arizona Government
- Cost Savings over T1 Telco Solutions (over 75% annually)
- County to County Connectivity
- State to County Connectivity
- Shared resources
  - Internet (High Speed Link)
  - Application Suite Libraries
  - Video Conferencing
    - Each County seat will have a video lab for training and emergency services. The lab scheduling will be maintained by CSA.
  - Combined Accounting Suite
- Secure environment
- Emergency Management/Homeland defense
- Release Telco Resources To Community
- Statewide Education Platform

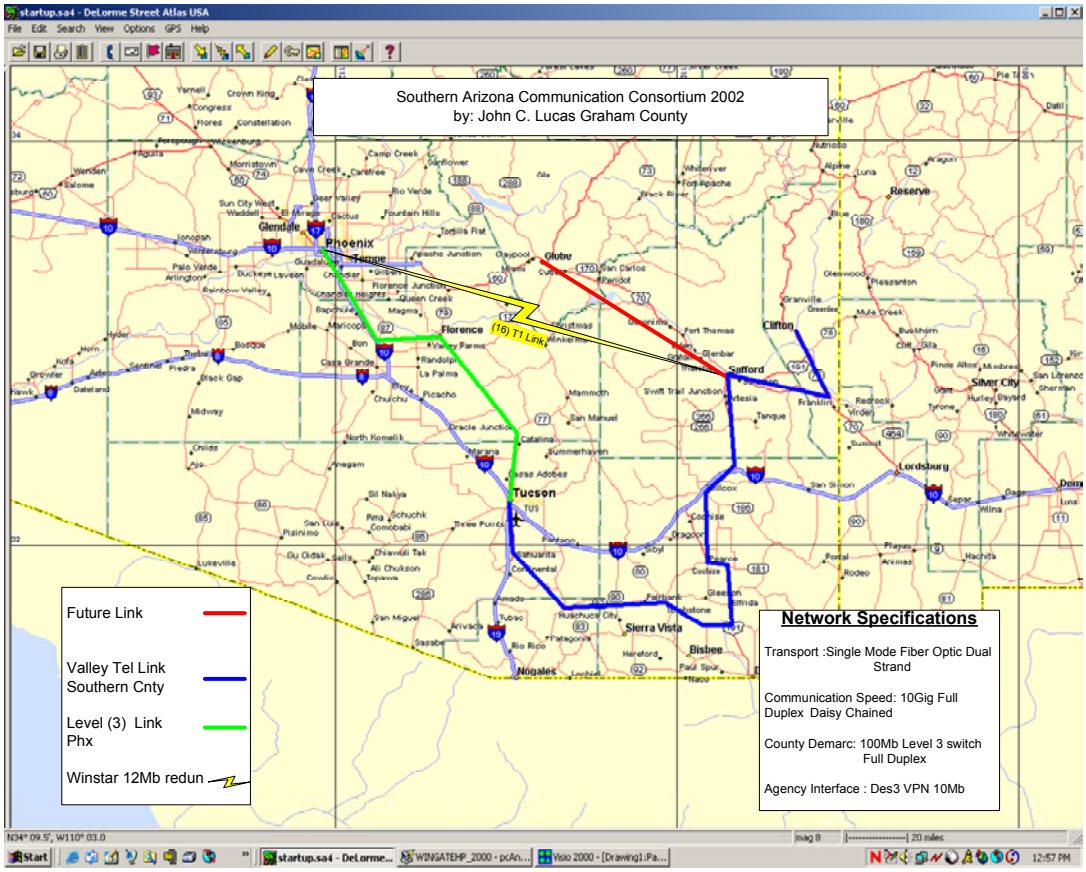
Overall Project Concept

- Purchase Fiber Strands (NRC) (20 Yr Lease)
- Yearly Maintenance Fee
- Co-locate in Valley Tel Facility
- Primary Demark at each County Seat or best location.
- Switched Backbone, all secure traffic Triple DES encryption
- (12) 1Gig Channels on Single Mode Fiber w/redundant microwave link
- Administered by CSA (County Supervisors Association)

SACCNet Communication Loop



SACCNet Fiber Path



APPENDIX F – TELEMEDICINE

Arizona Telemedicine Program
Network of Networks

January, 2004

Arizona Sites

Arizona Telemedicine Program Hospital/Clinic Sites

Arizona

							Video	Data
1	ADHS-CRS	150 N. 18th Ave.	Phoenix	AZ	85017	Maricopa	X	
2	Cobre Valley Community Hospital	5880 South Hospital Drive	Globe	AZ	85501	Gila		X
3	Desert Vista Behavioral Health Center	570 W. Brown	Mesa	AZ	85201	Maricopa	X	X
4	Flagstaff Medical Center (ADHS-CRS & NACP)	1200 N. Beaver St.	Flagstaff	AZ	86001	Coconino	X	X
5	Good Samaritan Regional Medical Ctr	1111 E. McDowell Road	Phoenix	AZ	85006	Maricopa	X	X
6	Hopi Healthcare Center	Milepost 388, Highway 264	Polacca	AZ	86042	Navajo	X	X
7	Kino Community Hospital	2800 E. Ajo Way	Tucson	AZ	85713	Pima		X
8	Maricopa Medical Center	2601 E. Roosevelt	Phoenix	AZ	85016	Maricopa	X	X
9	Mariposa Community Health Center	1852 N. Mastick Way	Nogales	AZ	85621	Santa Cruz	X	X
10	Mountain Park Health Center	635 E. Baseline Road	Phoenix	AZ	85040	Maricopa		X
11	NAIHS Chinle	P.O. Box Drawer PH	Chinle	AZ	86503	Apache	X	X
12	NAIHS Ft. Defiance	P.O. Box 649	Ft. Defiance	AZ	86504	Apache	X	X
13	NAIHS Inscription House	P.O. Box 7397	Tonalea	AZ	86044	Coconino	X	X
14	NAIHS Kayenta Service Unit	P.O. Box 368	Kayenta	AZ	86033	Navajo	X	X
15	NAIHS Tsaile	P.O. Box 467	Tsaile	AZ	86557	Apache	X	X
16	NAIHS Winslow Health Center	P.O. Drawer 40	Winslow	AZ	86047	Navajo	X	X
17	PAIHS Ak Chin Clinic	45203 W. Farrel Rd.	Maricopa	AZ	85238	Pinal		X
18	PAIHS Cibecue Health Center		Cibecue	AZ		Navajo		X
19	PAIHS Desert Visions Reg. Treatmnt Ctr.	198 S. Skill Center Rd.	Sacaton	AZ	85247	Pinal	X	X
20	PAIHS Eastern Arizona District Office	P.O. Box 2430	Pinetop	AZ	85935	Navajo		X
21	PAIHS Gila Crossing Health Center	P.O. Box 380	Laveeen	AZ	85339	Maricopa		X
22	PAIHS HuHuKam Memorial Hospital	P.O. Box 38	Sacaton	AZ	85247	Pinal		X
23	PAIHS OEH West. AZ District Office	10631 S. 51st St. #2	Phoenix	AZ	85044	Maricopa		X
24	PAIHS Phoenix Area Office	40 N. Central Ave. #605	Phoenix	AZ	85004	Maricopa		X
25	PAIHS Parker	Rt. 1, Box 12	Parker	AZ	85344	La Paz	X	X
26	PAIHS Peach Springs	P.O. Box 190	Peach Springs	AZ	86434	Mohave		X
27	PAIHS Phoenix Indian Medical Ctr	4212 N. 16th Street	Phoenix	AZ	85016	Maricopa	X	X
28	PAIHS Salt River Health Center	10005 E. Osborn Rd.	Scottsdale	AZ	85256	Maricopa		X
29	PAIHS San Carlos	P.O. Box 208	San Carlos	AZ	85550	Gila	X	X
30	PAIHS Whiteriver Service Unit	State Rte 73, Milepost 342	Whiteriver	AZ	85941	Navajo	X	X
31	Payson Regional Medical Center	807 Ponderosa	Payson	AZ	85541	Gila	X	X
32	Sage Memorial Hospital	PO Box 457, Route 264	Ganado	AZ	86505	Apache	X	X
33	Scottsdale Healthcare	9003 E. Shea Boulevard	Scottsdale	AZ	85260	Maricopa	X	
34	Southeast Arizona Medical Center	2174 Oak Ave	Douglas	AZ	85607	Cochise	X	X
35	Southwest PET Institute	3503 N. Campbell Ave.	Tucson	AZ	85719	Pima		X
36	St Elizabeth of Hungary Clinic	140 W. Speedway Blvd.	Tucson	AZ	85705	Pima	X	X
37	St. Joseph's Hosp. & Med. Ctr ADHS-CRS	350 W. Thomas Rd.	Phoenix	AZ	85013	Maricopa	X	
38	St. Luke's Medical Center	1800 E. Van Buren St.	Phoenix	AZ	85006	Maricopa		X
39	St Mary's Hospital	1601 W. St. Mary's Rd.	Tucson	AZ	85745	Pima	X	X
40	Tuba City Regional Health Care Corp	167 N. Main Sreet	Tuba City	AZ	86045	Coconino	X	X
41	Tucson Heart Hospital	4888 N. Stone Ave.	Tucson	AZ	85704	Pima		X
42	Tucson Med. Ctr – Square & Compass ADHS-CRS	2600 N. Wyatt Dr.	Tucson	AZ	85712	Pima	X	
43	University Medical Center	1501 N. Campbell Avenue,	Tucson	AZ	85724	Pima	X	X
44	Verde Valley Medical Center	269 S. Candy Lane	Cottonwood	AZ	86326	Yavapai	X	X
45	White Mountain Regional Medical Ctr	118 S. Mountain Avenue	Springerville	AZ	85938	Apache	X	X
46	Yuma Regional Med. Center ADHS-CRS	2400 Avenue A	Yuma	AZ	85364	Yuma	X	

ADHS CRS – Arizona Department of Health Services Children's Rehabilitative Services **NACP** – Native American Cardiology Program
NAIHS – Navajo Area Indian Health Service **PAIHS** – Phoenix Area Indian Health Service

The **Arizona Telemedicine Program Network** is a secure private network comprised of dedicated T3 and T1 telecommunications lines. All sites are connected via dedicated T1 circuit to the Arizona Telemedicine Program Network. (Exceptions: Verde Valley Medical Center is connected via the Northern Arizona Healthcare WAN to Flagstaff Medical Center, Cobre Valley Community Hospital is connected via Internet/VPN, Mt. Graham Regional Medical Center participates as a TeleHome Healthcare Hub.) Circuits to NAIHS Ft. Defiance, NAIHS Winslow Health Center, Tuba City Indian Medical Center, and to the PAIHS Las Vegas, NV Switch are T3.

Dial-up Videoconferencing. The Arizona Telemedicine Program Network has a dial-up videoconference capability to reach other hospitals and healthcare organizations with this capability, e.g., the Shriners Intermountain Hospital in Salt Lake City uses this capability to conduct regular telemedicine clinics with patients in Tucson.

ARIZONA TELEMEDICINE PROGRAM

Behavioral Health Clinical Sites

The following sites comprise the **Arizona TeleBehavioral Health Network** and can be linked by video to any video sites on the **Arizona Telemedicine Program** network through an interconnection between the two networks at the Northern Arizona Behavioral Health Authority (NARBHA) administrative office in Flagstaff.

							Video	Data
	NARBHA							
1	NARBHA	1300 S. Yale Street	Flagstaff	AZ	86004	Coconino	X	
2	Community Behavioral Health Svs	32 N. 10th Ave., #1,2	Page	AZ	86040	Coconino	X	
3	Community Counseling Centers	211 E. Third Street	Winslow	AZ	86047	Navajo	X	
4	Community Counseling Centers	105 North Fifth Avenue	Holbrook	AZ	86025	Navajo	X	
5	Community Counseling Centers	2550 Show Low Lake Rd	Show Low	AZ	85901	Navajo	X	
6	Little Colorado Behav. Health Ctrs	470 W. Cleveland	St. Johns	AZ	85936	Apache	X	
7	Little Colorado Behav. Health Ctrs	50 North Hopi	Springerville	AZ	85936	Apache	X	
8	Mohave Mental Health Clinics	1743 Sycamore Ave.	Kingman	AZ	86401	Mohave	X	
9	Mohave Mental Health Clinics	2187 Swanson	Lake Havasu City	AZ	86403	Mohave	X	
10	Mohave Mental Health Clinics	1145 Marina Blvd.	Bullhead City	AZ	86442	Mohave	X	
11	Verde Valley Guidance Clinic	600 S. Willard Street	Cottonwood	AZ	86326	Yavapai	X	
12	West Yavapai Guidance Clinic	642 Dameron Drive	Prescott	AZ	86301	Yavapai	X	
13	Ariz. Council of Human Service Providers	2100 N. Central Avenue	Phoenix	AZ	85004	Maricopa	X	
14	Arizona State Hospital (ASH)	2500 E. Van Buren	Phoenix	AZ	85008	Maricopa	X	
							Video	Data
	EXCEL							
15	Excel Family & Adult Services	3220 E. 40th Street	Yuma	AZ	85365	Yuma	X	
16	Excel Child Services	2501 Arizona Avenue	Yuma	AZ	85364	Yuma	X	
17	Excel San Carlos	106 E. 1st Street	Yuma	AZ	85364	Yuma	X	
18	La Paz County Behavioral Health Svs	1021 Kofa Avenue	Parker	AZ	85344	La Paz	X	
19	Excel Group Quartzite	730 West Cowell	Quartzite	AZ	85346	LaPaz	X	
20	San Luis Behavioral Health Services	679 N. 1st St., Suite E	San Luis	AZ	85349	Yuma	X	
21	Excel Group East County	28671 Los Angeles Ave.	Wellton	AZ	85356	Yuma	X	
							Video	Data
	PGBHA							
22	PGBHA	2066 W. Apache Trail, Ste 116	Apache Junction	AZ	85220	Pinal	X	
23	Superstition Mt Mental Health Ctr	150 Ocotillo, Bldg 2	Apache Junction	AZ	85220	Pinal	X	
24	San Pedro Valley Behavioral Health	100 Tilbury Drive	Kearny	AZ	85237	Pinal	X	
25	Horizon Human Services	120 W. Main	Casa Grande	AZ	85222	Pinal	X	
26	Horizon Human Services	478 Hagen Hill	Globe	AZ	85539	Gila	X	
27	Pinal Hispanic Council	712 N. Main St.	Eloy	AZ	85231	Pinal	X	
28	Rim Guidance Center	404 W. Aero Drive	Payson	AZ	85541	Gila	X	
29	San Pedro Valley Behavioral Health	900 Mt. Lemmon Rd.	Oracle	AZ	85623	Pinal	X	
							Video	Data
	CPSA							
30	Community Partnership of So. Arizona	4575 E. Broadway	Tucson	AZ	85711	Pima	X	
31	CPSA Training Center	2502 N. Dodge	Tucson	AZ	85716	Pima	X	
32	Casa de Esperanza	780 S. Park Centre Ave.	Green Valley	AZ	85614	Pima	X	
33	CODAC	3100 N. 1st Ave.	Tucson	AZ	85719	Pima	X	
34	COPE Behavioral Services, Inc.	101 S. Stone	Tucson	AZ	85701	Pima	X	
35	La Frontera	502 W. 29th St.	Tucson	AZ	85713	Pima	X	
36	Marana Health Clinic	13644 N. Sandario Rd.	Marana	AZ	85653	Pima	X	
37	Providence of Arizona, Inc.	620 N. Craycroft	Tucson	AZ	85711	Pima	X	
38	Pantano Behavioral Health Services	5055 E. Broadway, C-104	Tucson	AZ	85711	Pima	X	
39	CPSA-Sierra Vista	999 E. Fry Blvd., Ste 109	Sierra Vista	AZ	85635	Cochise	X	
40	SEABHS-Sierra Vista	185 S. Moorman	Sierra Vista	AZ	85635	Cochise	X	
41	SEABHS-Benson	590 S. Ocotillo Ave.	Benson	AZ	85602	Cochise	X	
42	Southeastern AZ Psych Health Facility	470 S. Ocotillo Ave.	Benson	AZ	85602	Cochise	X	
43	SEABHS-Nogales	32 Blvd del Rey David	Nogales	AZ	85621	Santa Cruz	X	
44	SEABHS-Douglas	1701 N. Douglas Avenue	Douglas	AZ	85607	Cochise	X	
45	SEABHS-Safford	680 Eighth Street	Safford	AZ	85546	Graham	X	
46	SEABHS-Bisbee	214 Bisbee Rd.	Bisbee	AZ	85603	Cochise	X	
47	ADHS-Div. of Behavioral Health Services	150 N. 18th Ave., Suite 200	Phoenix	AZ	85007	Maricopa	X	

NARBHA-Northern Arizona Behavioral Health Authority **EXCEL**-The Excel Group
PGBHA-Pinal Gila Behavioral Health Authority **CPSA**-Community Partnership of Southern Arizona

Arizona Correctional Telemedicine Sites

The **Arizona Telemedicine Program** Network provides network connections to 10 Arizona Department of Corrections sites:

							Video	Data
	AZ Dept. of Corrections							
1	AZ DOC Director's Office		Phoenix	AZ		Maricopa	X	X
2	AZ DOC Inmate Health Services Central Office	2005 N. Central Avenue	Phoenix	AZ	85004	Maricopa	X	X
3	ASPC Douglas	PO Drawer 3867	Douglas	AZ	85608	Cochise	X	X
4	ASPC Eyeman	SMUII, PO Box 695, 4374 e. Butte	Florence	AZ	85732	Pinal	X	X
5	ASPC Florence	P.O. Box 3867	Florence	AZ	85732	Pinal	X	X
6	ASPC Lewis	26700 S. Hwy 85, PO Box 70	Buckeye	AZ	85326	Maricopa	X	X
7	ASPC Perryville	PO Box 3000	Goodyear	AZ	85336	Maricopa	X	X
8	ASPC Safford	896 S. Cook Road	Safford	AZ	85548	Graham	X	X
9	ASPC Tucson	10000 S. Wilmot Rd.	Tucson	AZ	85734	Pima	X	X
10	ASPC Yuma	7125 E. Juan Sanchez Blvd.	San Luis	AZ	85349	Yuma	X	X

Maricopa Correctional Health Services will be connecting 10 Maricopa County Jails during 2003-04. Pima County Institutional Health will be connecting 3 county detention facilities in 2003.

Health Sciences Education and Research Sites

Arizona Telemedicine Program connects to additional health sciences education and research sites:

							Video	Data
	Education/Research							
1	UA AHSC Phoenix Programs	4001 N. 3rd Street, Suite 415	Phoenix	AZ	85012	Maricopa	X	X
2	NAU College of Health Professions	Col of Health Prof Room 229	Flagstaff	AZ	86011	Coconino	X	
3	Native American Cancer Research Partnership - UA	1527 E. Mabel Street	Tucson	AZ	85721	Pima	X	
4	Native American Cancer Research Partnership - NAU	Bldg 3	Flagstaff	AZ	86011	Coconino	X	

Pediatirians in Yuma want telecardiology

Western Region
Hospital/Clinic Sites

Nevada

							Video	Data
1	PAIHS Reno/Sparks	34 Reservation Rd.	Reno	NV	89502	Washoe		X
2	PAIHS Southern Bands Health Center	515 Shoshone Circle	Elko	NV	89801	Elko		X

New Mexico

							Video	Data
1	NAIHS Crownpoint Hospital		Crownpoint	NM	87313	McKinley	X	X
2	NAIHS Gallup Indian Medical Center	P.O. Box 1137	Gallup	NM	87301	McKinley		X
3	NAIHS Northern Navajo Medical Ctr	P.O. Box 160	Shiprock	NM	87420	San Juan	X	X
4	NAIHS Tohatchi Health Center		Tohatchi	NM	87325	McKinley		X

Utah

							Video	Data
1	PAIHS Ft. Duchesne	P.O. Box 160	Ft. Duchesne	UT	84026	Uintah		X
2	Intermountain Shriners Hospital	Fairfax Rd. at Virginia St.	Salt Lake City	UT	84103		ISDN	

International Sites

Panama

	Institution	City	District	Specialties
1	Royal Center	Panama City	Panama	General
2	Hospitalario Metropolitano de la Caja de Seguro Social	Panama City	Panama	General, Pathology, Radiology
3	Hospital Oncologico (Gorgas)	Panama City	Panama	Pathology, Radiology
4	Caja de Seguro Social Policlinica	Las Tablas	Los Santos	Radiology
5	El Vigia Hospital	Chitre	Herrera	Pathology
6	Caja de Seguro Social	Changuinola	Bocas del Toro	General, Radiology

All connections within Panama are currently PSTN (Public Service Telephone Network). Connectivity to the U.S. is via the Internet. E1/T1 circuits are planned within Panama and to the U.S. in 2003-04.

APPENDIX G – WIRELESS

Freedom to connect

Wireless Internet access is popping up in unexpected places

By Roger Fillion, Rocky Mountain News
January 19, 2004

When he rolls into a truck stop, trucker Terry Feldman sometimes bunks down in his cab for a two-hour nap, depending on the time of day. He also might head inside to grab a cheeseburger or a shower.

Recently, Feldman added a new routine to some of his stops: He pops open his laptop computer and logs on to the Internet - wirelessly and from the comforts of his truck, thanks to a technology initially popular at trendy coffee hangouts and hotels.

The Colorado Springs resident, who drives for Commerce City- based Navajo Express, zaps e-mails to family and friends. He checks weather and road conditions online, especially in the winter when treacherous conditions can cause road closures. He retrieves maps.

Feldman also might investigate something he's seen splashed on a roadside billboard - like the time he logged on to the Web site of a dental health plan he saw advertised in Bethlehem, Pa.

"I'll just pull into the lot, pull out the computer, and away you go," said Feldman, who pays $1.95 an hour for a service deployed at 145 Flying J travel plazas around the nation, including Colorado. "It's a lot better than having to look for a phone jack inside."

To get online, Feldman uses a high-speed wireless Internet access system typically associated with the likes of Marriott hotels or Starbucks coffee shops.

Wireless-fidelity, or Wi-Fi, is surfacing in more mainstream public establishments, as Feldman's experience shows.

"I suspect we'll see more interesting places like the truck stops and RV parks coming out," said Phillip Redman, an analyst with researcher Gartner Inc.

Indeed.

Wi-Fi "hot spots" are popping up in other, less conventional public venues: marinas, barbershops, beauty parlors, public libraries, train stations and coin laundries. Selected McDonald's restaurants are rolling out Wi-Fi access in cities such as New York, Chicago, Seattle and San Francisco.

Some places may end up drawing few Web surfers. Still, such venues appear willing to bet Wi-Fi will attract tech junkies who otherwise wouldn't stroll inside.

"Offering it as a utility helps attract customers. As long as it can be rolled out cost-effectively, that can help a business," said Ross Rubin, senior analyst with New York researcher eMarketer.

Explosive growth

Wi-Fi is a radio signal that beams Internet connections 300 feet or more. It gives on-the-go Web surfers a speedy, un-tethered link to the Internet.

Wi-Fi is 100 times faster than an ordinary phone line. The speed at which users ultimately get online depends on the broadband connection - DSL or cable, for example - that ties the Wi-Fi network into the Internet.

Users can log on using a laptop computer or a handheld personal digital assistant.

The technology is experiencing explosive growth and use.

According to Gartner's research, the number of public Wi-Fi hot spots in North America is expected to surge to 50,811 this year from 28,680 in 2003. The number is expected to hit 53,479 by 2008.

A recent convert is the Dakota Ridge RV Park in Golden, nestled at the base of the Front Range foothills.

Built in 1992 on a former wheat field, the park offers motor-home and trailer enthusiasts more than 140 paved sites. Picnic tables dot the grounds. Satellite-TV dishes sit atop the RVs.

A new object recently sprouted from the top of the Dakota Ridge offices: a roughly 8-foot-tall Wi-Fi antenna.

The Wi-Fi network was installed last November. It can reach residents throughout the 5-acre park. And it augments the ordinary phone lines that residents previously relied on to get online.

That's been great for Sylvi Braathen, a life coach who speaks to clients in Norway and Sweden from a home office in her motor home. The sessions last 30 to 45 minutes.

Before Wi-Fi's arrival at Dakota Ridge, Braathen used the Dakota Ridge phone system to talk with her clients.

"The phone had a tendency to cut out. It wasn't a very good line," she recalled.

What's more, her clients would sometimes have to dial different numbers to get in touch with her, given the nature of the RV park's phone system.

'Thirsty for Wi-Fi'

The Wi-Fi hot spot has changed that - and more.

Braathen now uses an Internet-based phone system, a move that has cut her clients' overseas calling costs to zero. And Braathen no longer complains about broken connections.

"It's so much easier now," she said. "It's great."

Dakota Ridge managers don't know exactly how many residents are using the Wi-Fi system. Dakota Ridge has sold about eight Wi-Fi computer adapters to residents. The service costs $29.99 a month.

An official with the company that installed the network said that 20 percent to 30 percent of residents use the Wi-Fi network within a typical RV park.

Austin Tucker, director of sales for Austin, Texas-based Coach Connect, said interest among RV parks in the company's Wi-Fi systems has been "incredible."

"We've got 12 parks up and running. We have contracts for a whole lot more," said Tucker.

Tucker noted that RV users typically are an affluent, computer-using bunch. They stay in touch through e-mail. They pay bills online. They download photos of their grandchildren. Or, like Braathen, they run a business from their motor home.

"They're not ignorant. They're thirsty for (Wi-Fi)," said Tucker.

Truck drivers and truck stops also are a target market.

"The truck stop is quite a unique niche. About 25 percent to 30 percent of drivers are walking around with laptops," said Michael Young, director of sales and marketing at TON Services, the Flying J subsidiary that's deploying Wi-Fi for the Ogden, Utah, truck stop operator and diesel fuel distributor.

Young contended that as laptop prices get cheaper, more truckers will buy them.

Truckers, however, don't appear to be flocking to the system - at least not yet. At the Rip Griffin Travel Center in Limon, many weren't familiar with Wi-Fi or didn't own a laptop computer.

But the company that set up the truck stop's Wi-Fi system, San Antonio-based Truckstop.net, thinks truckers are a natural market - partly because of the trucking industry's historic use of communications technology, ranging from CB radios to cell phones and satellite tracking.

Allan Meiusi, vice president of Truckstop.net, also said Wi-Fi is a good fit for truckers who need to accomplish a lot when they stop for a break - beyond just fueling up, eating, showering and sleeping.

With Wi-Fi, he predicted, the trucker is "going to be getting his e-mails and corresponding with his family or doing his online banking or other online business transactions."

Free hot spots

What's more, truckers could use the system to line up loads by going to Web sites that match truckers with shippers needing to move freight.

While Wi-Fi users may pay for the service at truck stops or RV parks and elsewhere, free public Wi-Fi access exists, too.

The public library in Evergreen is such a location.

The Jefferson County Public Library introduced the free service at its 10-year-old Evergreen branch last summer and plans to extend it elsewhere.

"It has brought people into the library who might not (otherwise) use the library," said Adrianne Peterson, the library's head of reference and adult services. "We think it's the coolest thing."

Users seem to think so, too. After learning the library offered Wi-Fi, one patron ran home and came back with his laptop - even though the library was closing in 25 minutes.

Software salesman Tony Stowe has adopted the library as his second office. Stowe lives three miles down the road and doesn't have a broadband connection at his home office.

When he's not on the road, Stowe often climbs into his car with his laptop and drives to the library to take advantage of the free Wi-Fi connection. In fact, Stowe says he can spend three out of five days a week at the library, in shifts of up to five hours there.

"It's a heck of a lot cheaper than trying to bring broadband to our home. It's free," said the Evergreen resident.

On a recent evening, Stowe was seated at a desk in one of the library's quiet rooms. The room features a vaulted ceiling, wood paneling and a fireplace.

Stowe was busy on his laptop, trolling the Internet for potential software customers.

The quicker Wi-Fi speed makes it easier for him to transfer large data files to prospective customers, as well as to the software company he represents.

But Stowe - who's been in the technology business two decades - is careful not to get too carried away with the Wi-Fi network. For example, he doesn't use it to play online games or other recreational activities.

"I figure I spend enough time in front of a computer," he said.

fillionr@RockyMountainNews.com *or 303-892-2467*

APPENDIX H – SERVICE PROVIDER SUMMARIES

APPENDIX I – FINANCIAL PROJECTIONS

APPENDIX J – QWEST

- Central Offices
- Exchange Maps
- Qwest Brochure

QWEST CENTRAL OFFICES

City	Switch Name	Switch Code	Host Switch	Tandem Switch	Switch Type	Switch Software	Business NALS	Residential NALS
Arizona City	Arizona City	AZCYAZ03RS1	CSGRAZMADS0	PHNXAZMA07T	RSC	LEC015	-	-
Casa Grande	Casa Grande	CSGRAZMADS0		PHNXAZMA07T	DMS100	LEC015	7961	13,843
Eloy	Eloy	ELOYAZ01RS1	CSGRAZMADS0	PHNXAZMA07T	RSC	LEC015	1,291	4,999
Florence	Florence	FLRNAZMARS1	CSGRAZMADS0	PHNXAZMA07T	RSC	LEC015	1,292	3,525
Globe	Globe	GLOBAZMARS1	SNMNAZMADS0	TCSNAZMA04T	RSC	LEC015	2,217	5,420
Kearny	Kearny	KRNYAZMARS1	SNMNAZMADS0	TCSNAZMA04T	RSC	LEC015	282	1,026
Miami	Miami	MIAMAZMARS1	SNMNAZMADS0	TCSNAZMA04T	RSC	LEC015	370	1,380
Maricopa	Maricopa	MRCPAZMARS1	CSGRAZMADS0	PHNXAZMA07T	RSC*	LEC015	476	2,304
Pine	Pine	PINEAZMARS1	PYSNAZMADS0	PHNXAZMA07T	5RSM	5E15.1	225	2,656
Payson	Payson	PYSNAZMADS0		PHNXAZMA07T	5ES	5E15.1	3,714	10,231
Stanfield	Stanfield	STFDAZMARS1	CSGRAZMADS0	PHNXAZMA07T	RSC	LEC015	229	1,126
Apache Jct	Superstition East	SPRSAZEADS0		PHNXAZMA01T	DMS100	LEC015	3,667	26,871
Apache Jct	Superstition Main	SPRSAZMADS0		PHNXAZMA01T	DMS100	LEC015	2,917	40,580

* A DMS100 is scheduled to be installed 6/26/04.

Source: Qwest ICONN Database, 2002

QWEST CORPORATION

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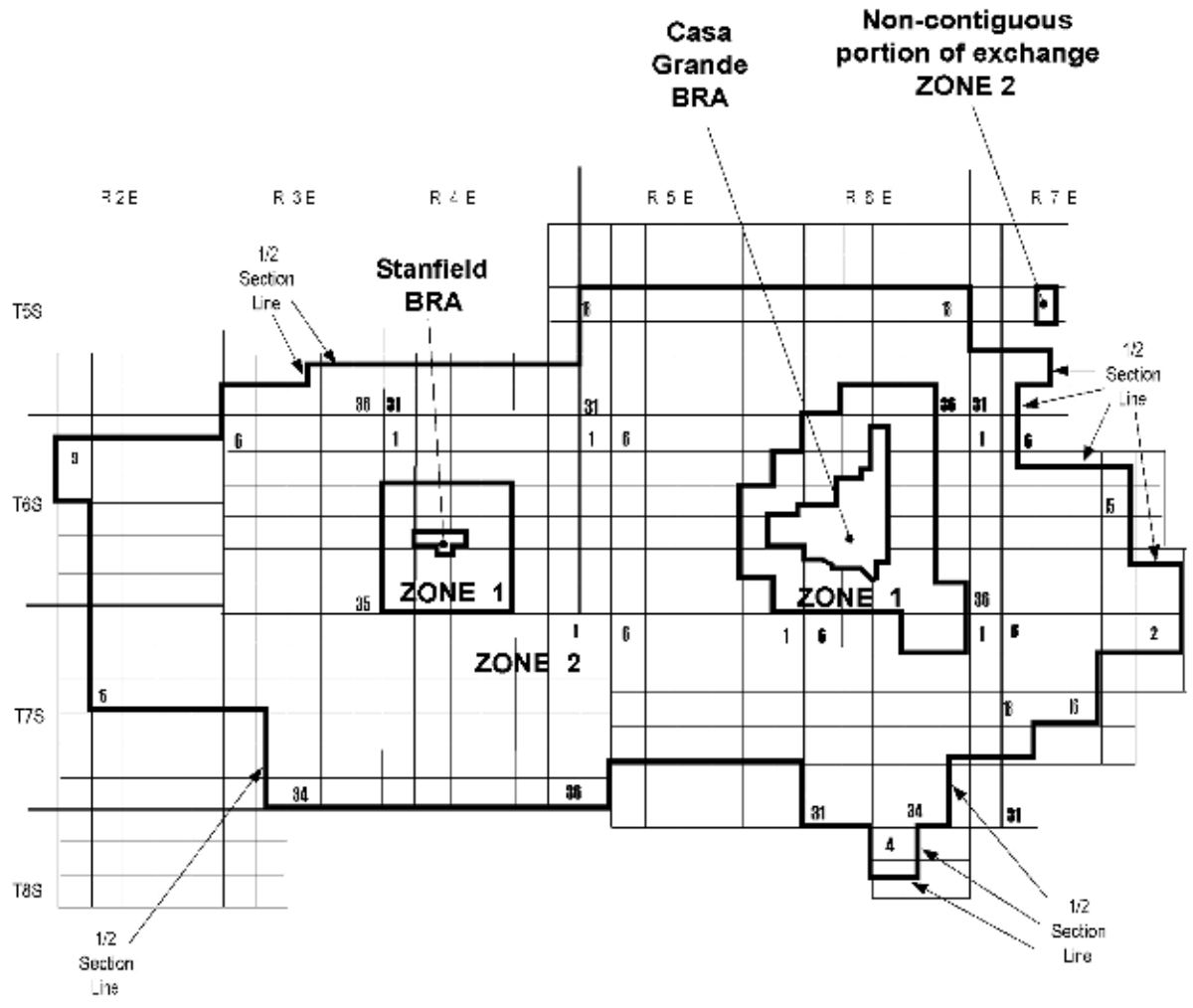
Supersedes Twenty-third Revised Sheet



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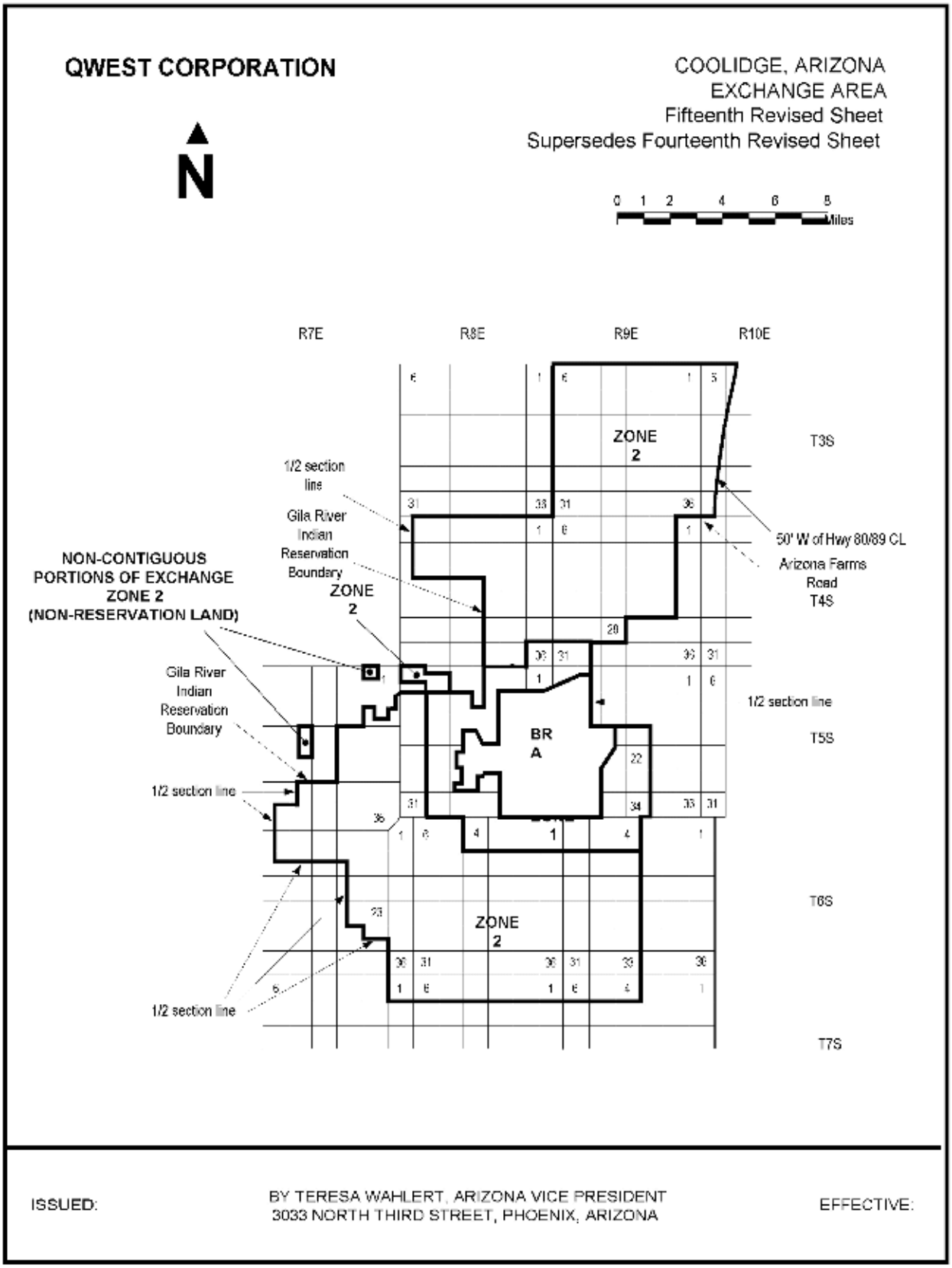
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COOLIDGE, ARIZONA
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Supersedes Fourteenth Revised Sheet
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ZONE 2
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Gila River Indian Reservation Boundary
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ELOY, ARIZONA
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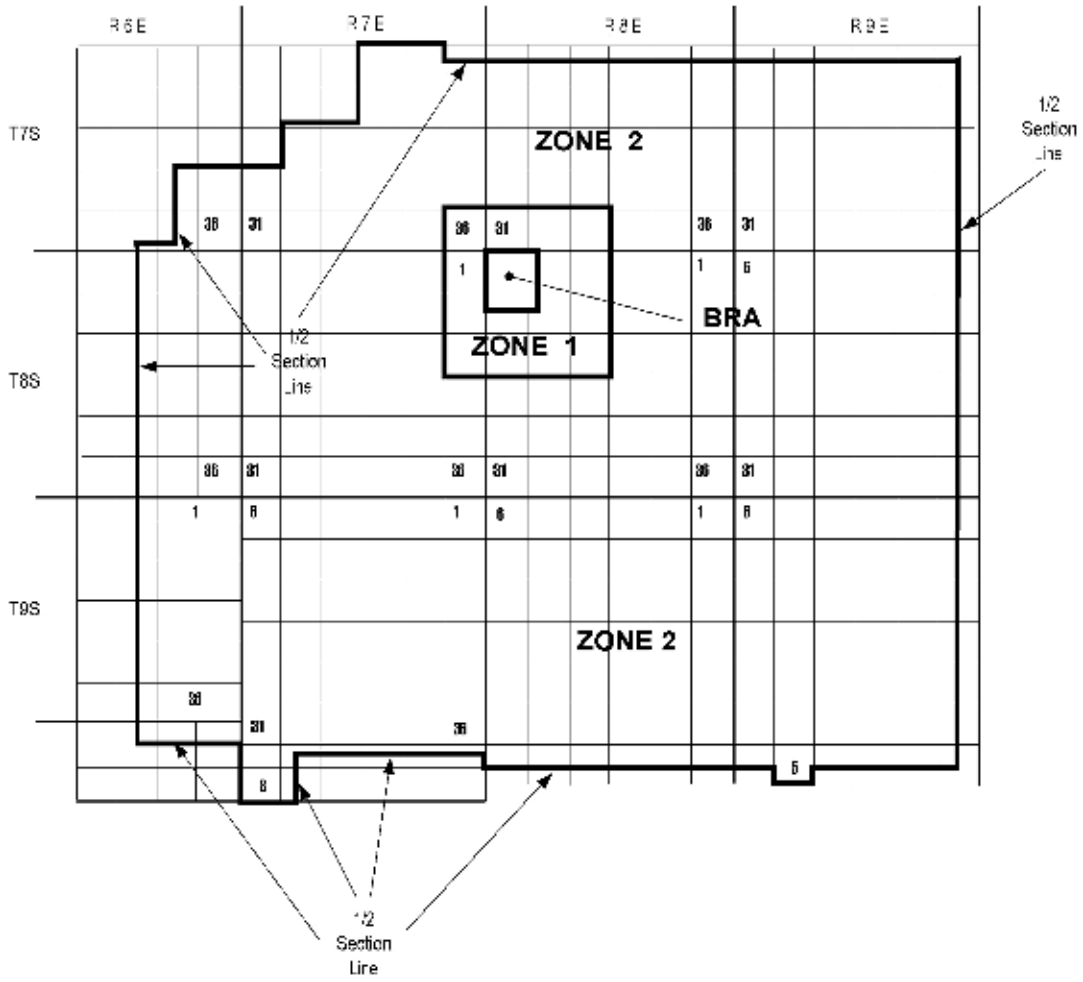
Supersedes Eighth Revised Sheet



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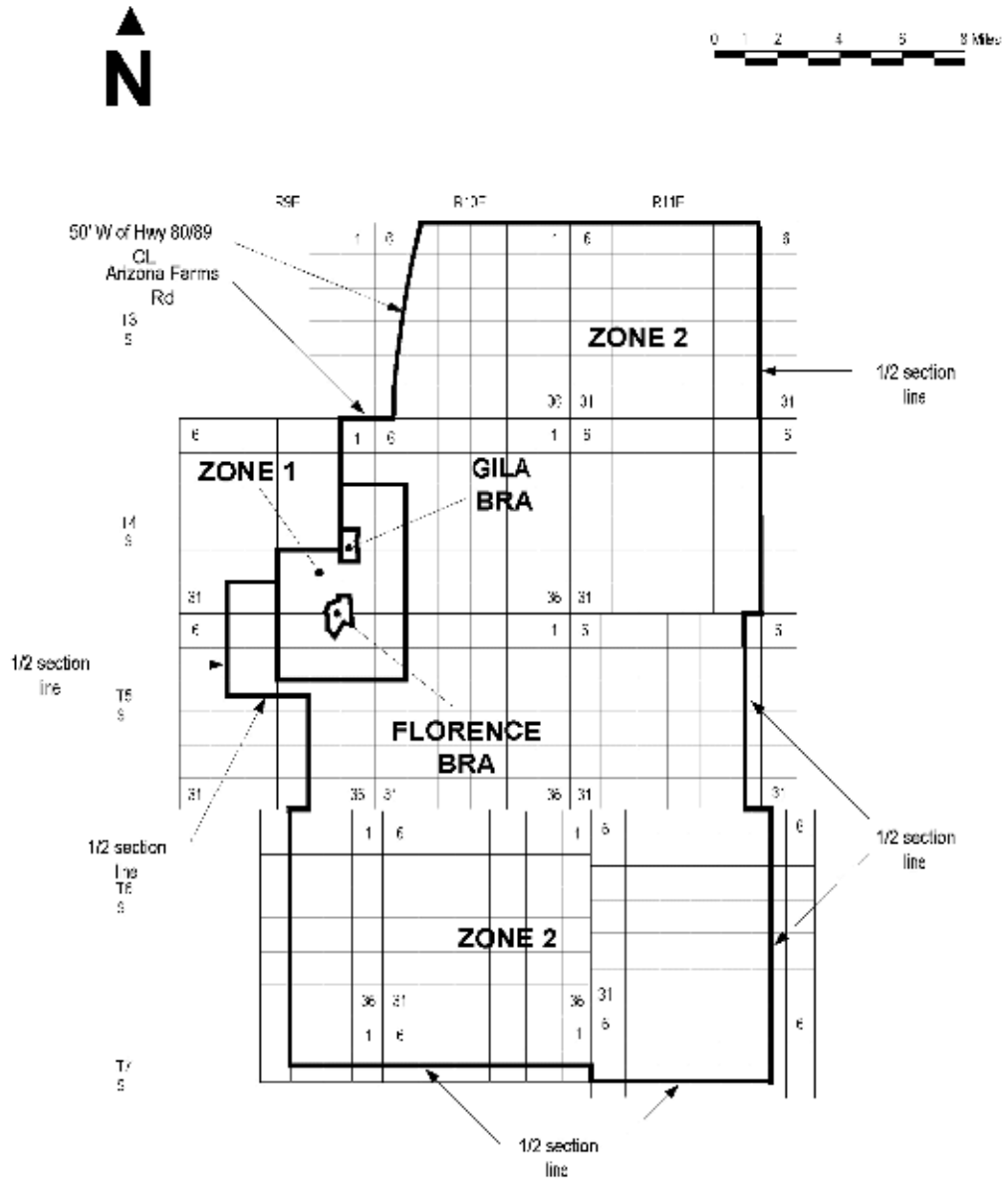

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GLOBE, ARIZONA
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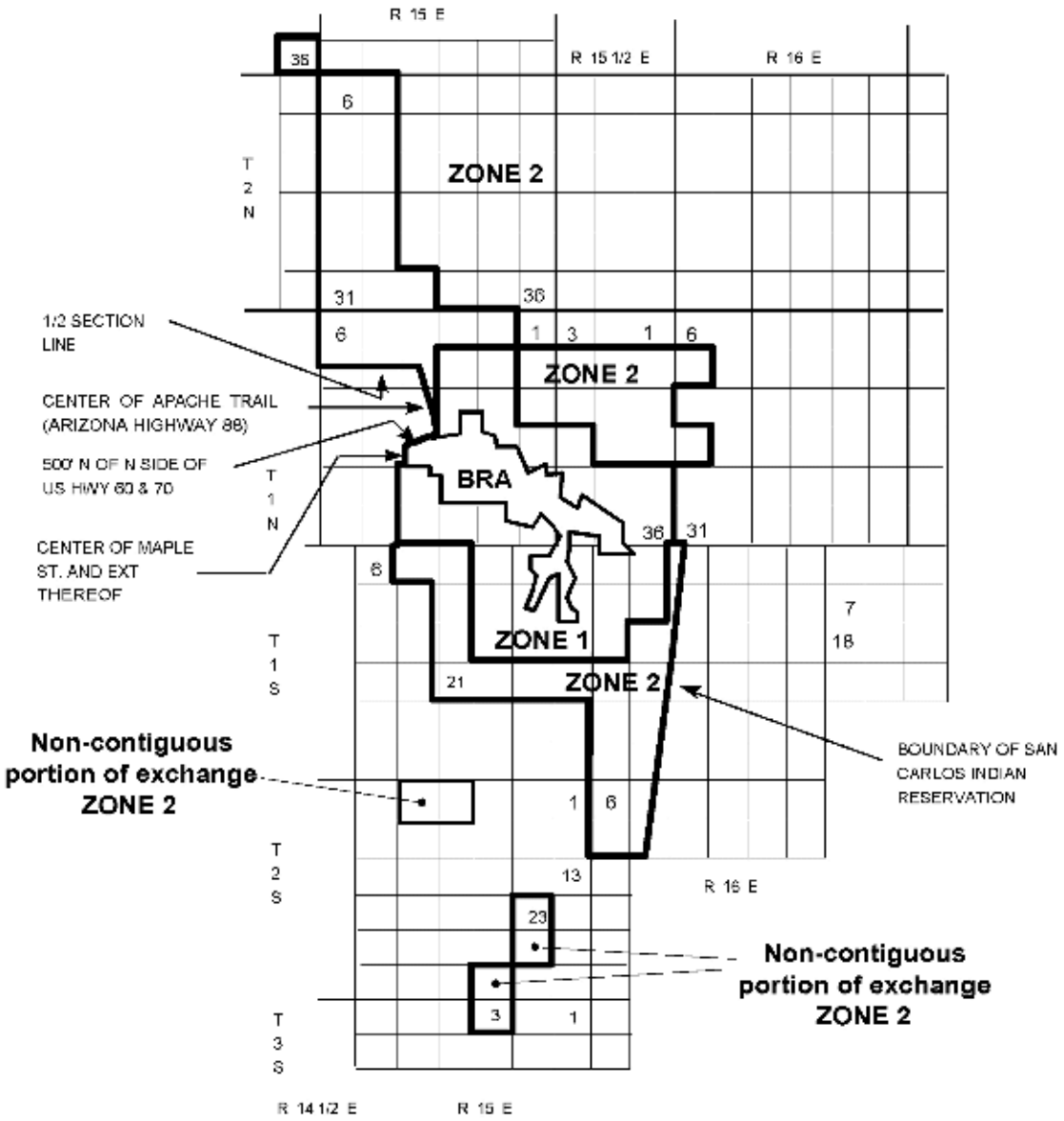

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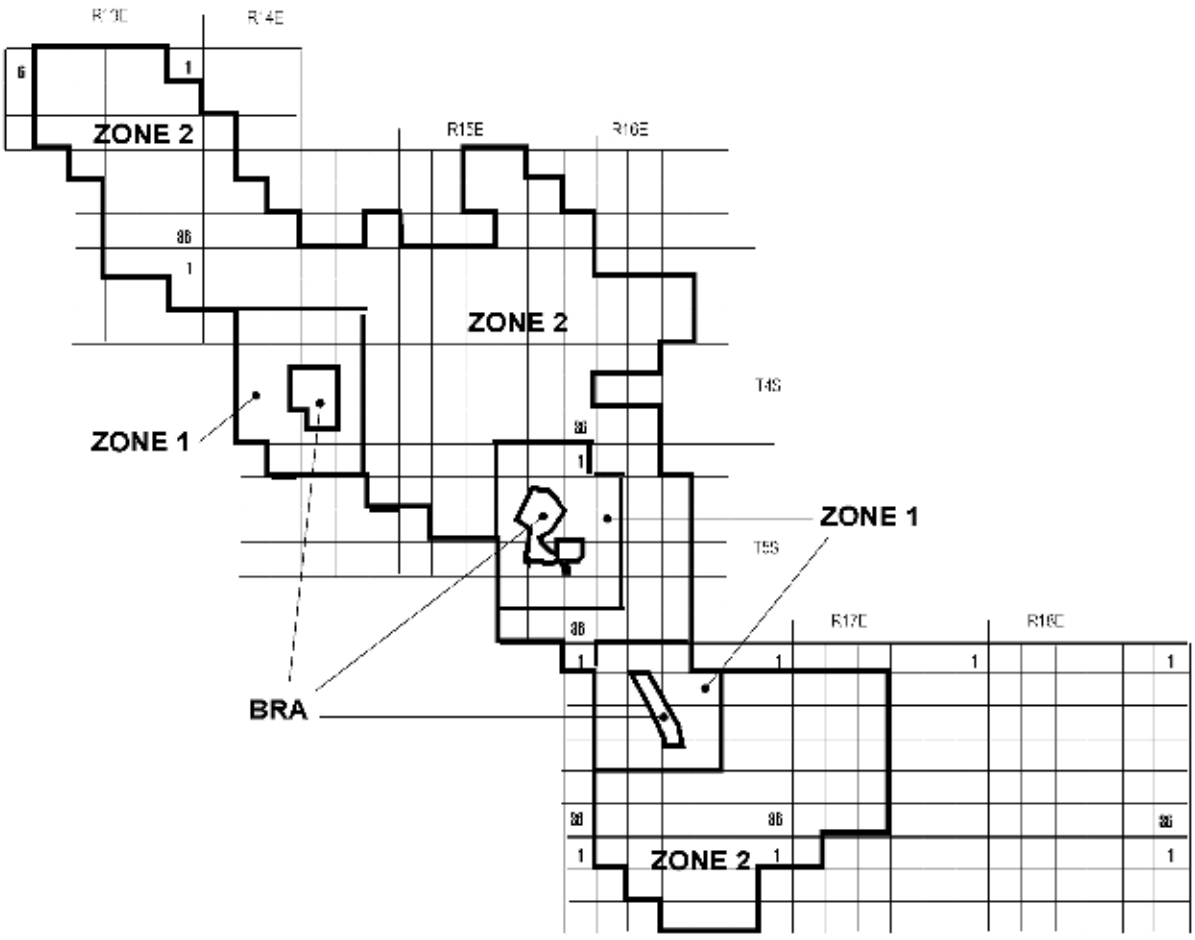

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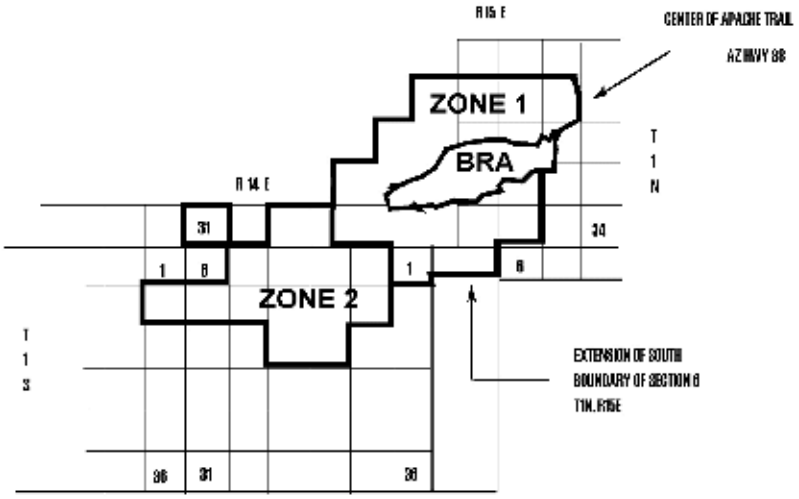

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PAYSON, ARIZONA
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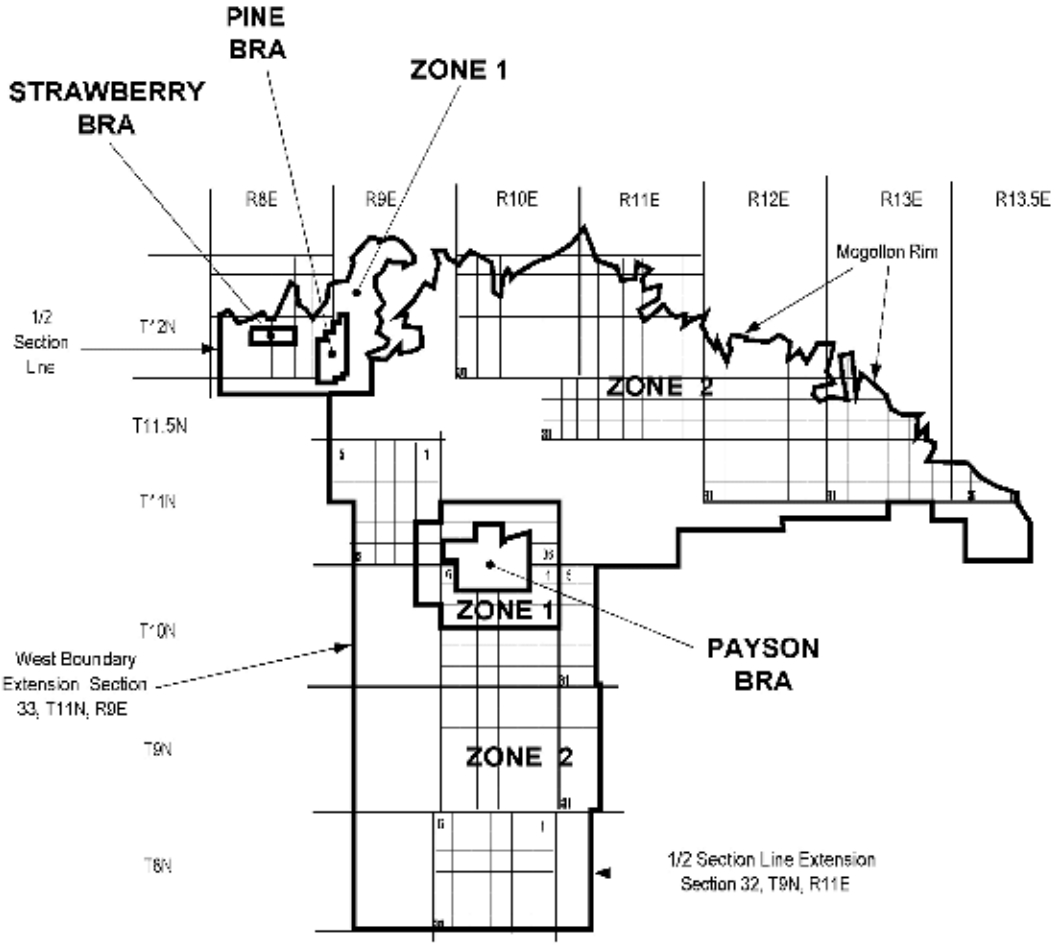

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EXCHANGE AREA
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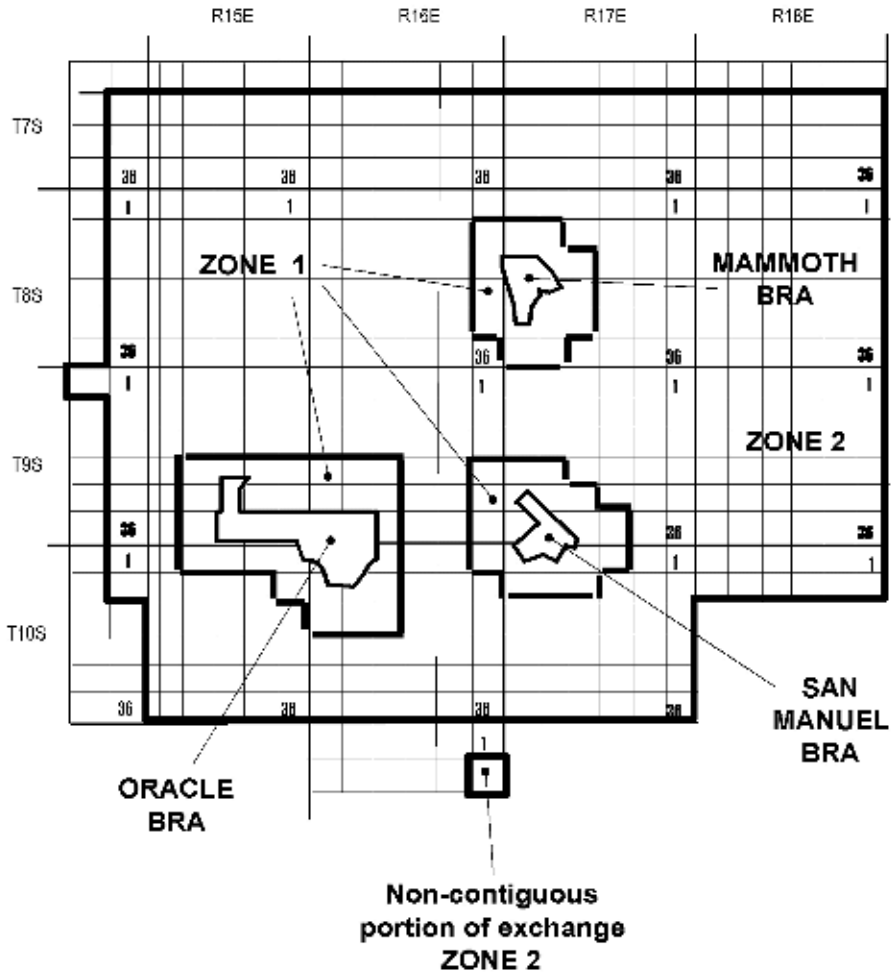
Supersedes Tenth Revised Sheet



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SUPERIOR, ARIZONA
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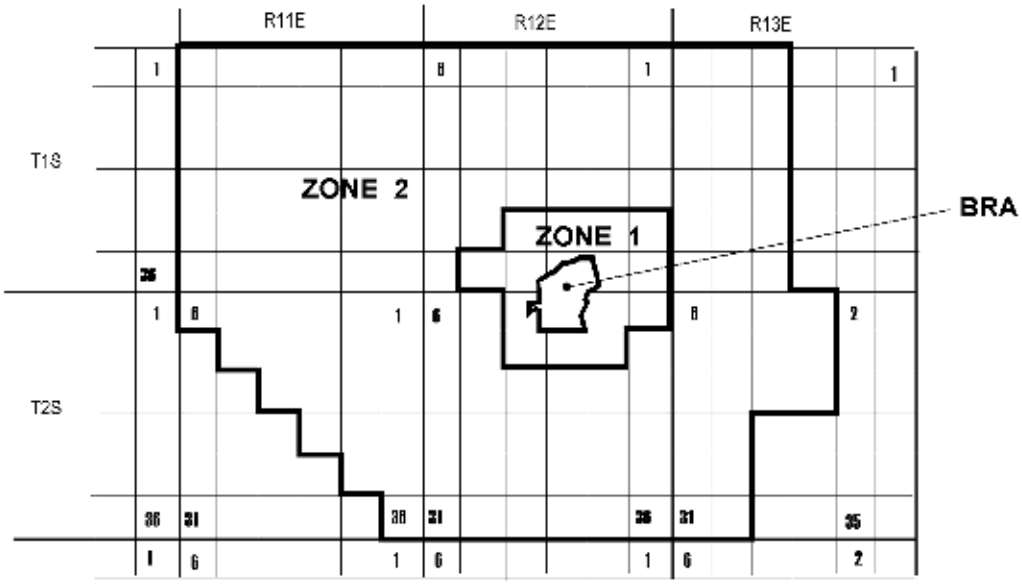

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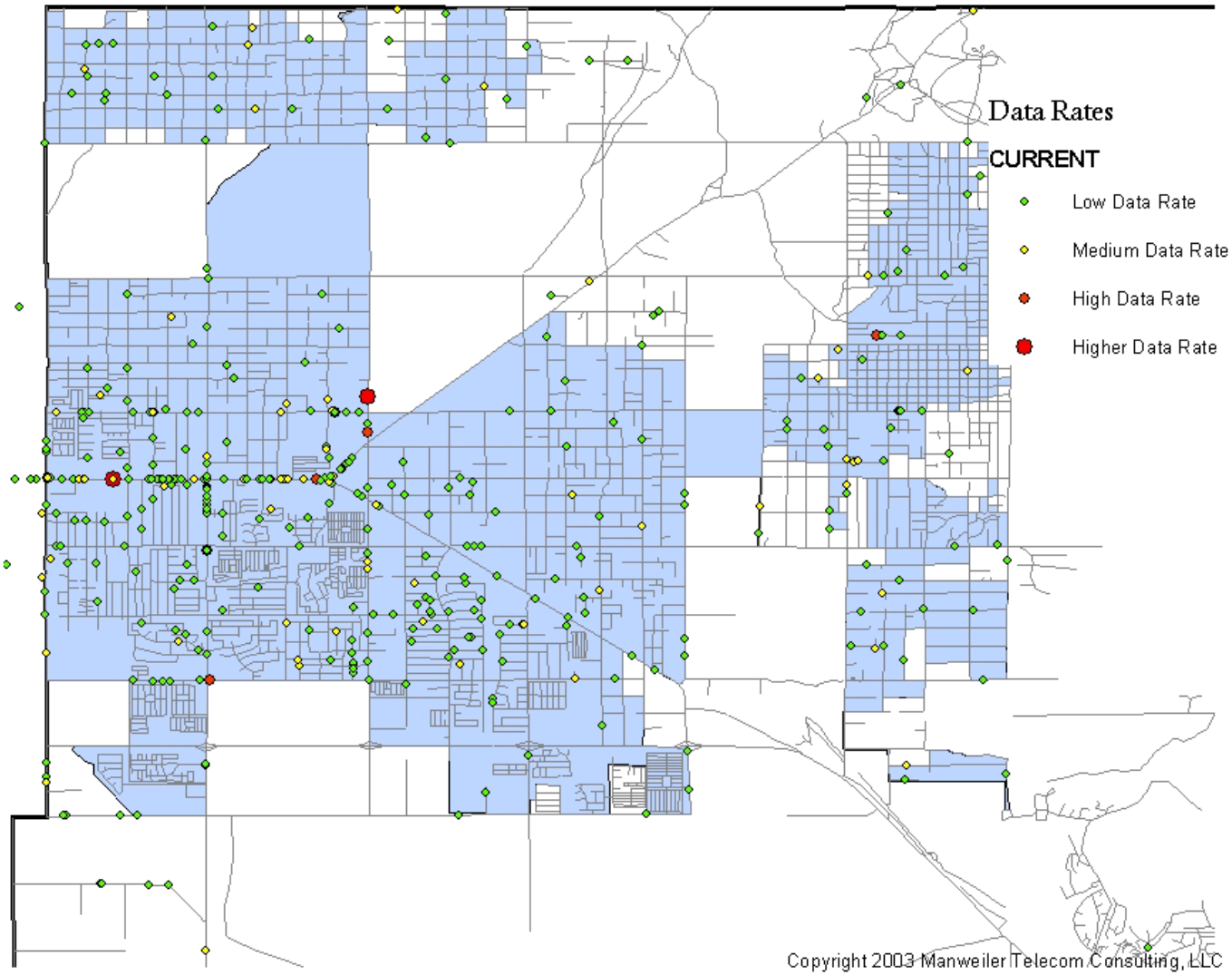
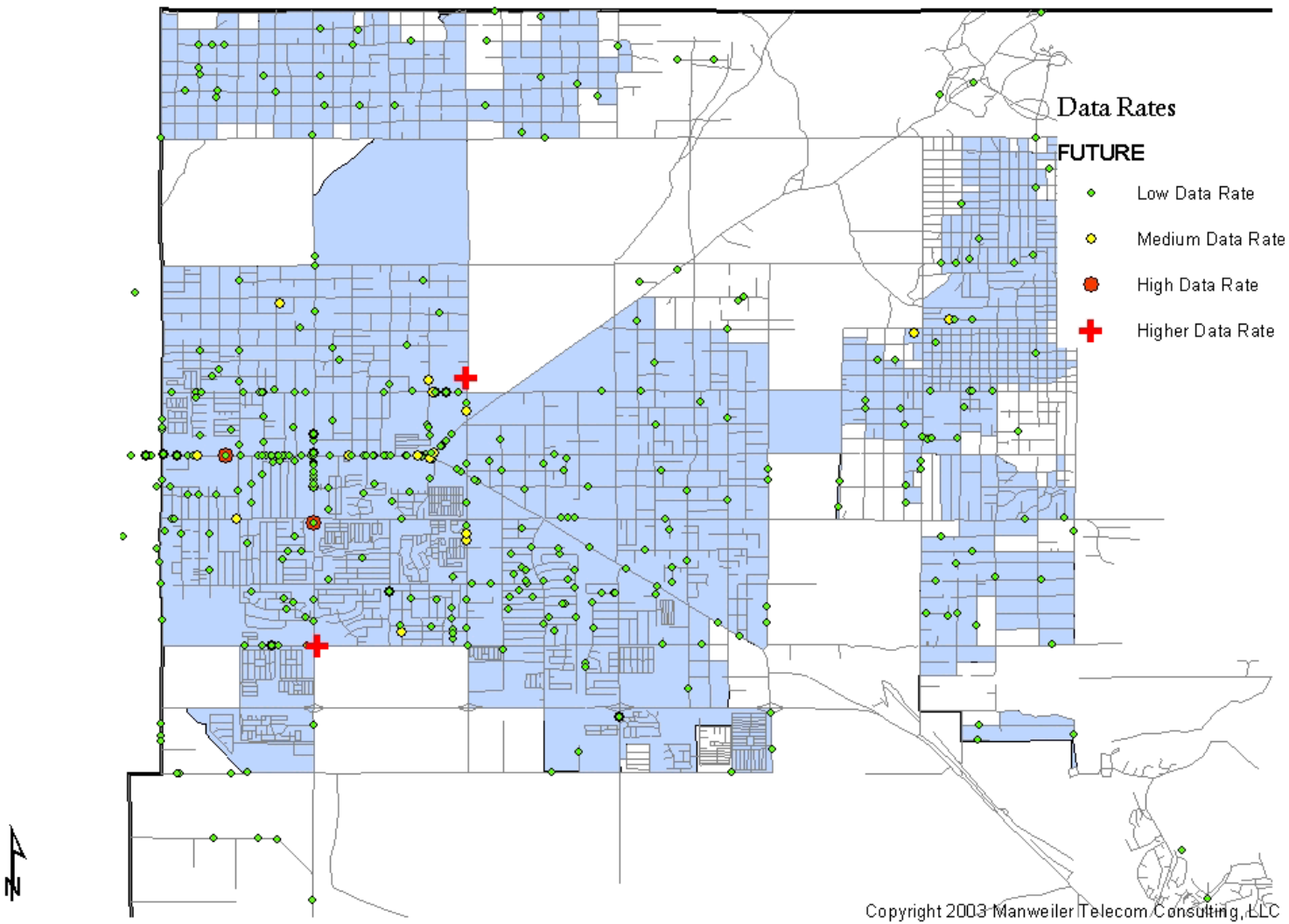
APPENDIX K– MAPS

- City Maps of Demand
- Local Provider Locations
- McLeodUSA Network

Pinal County - Apache Junction



Pinal County - Apache Junction



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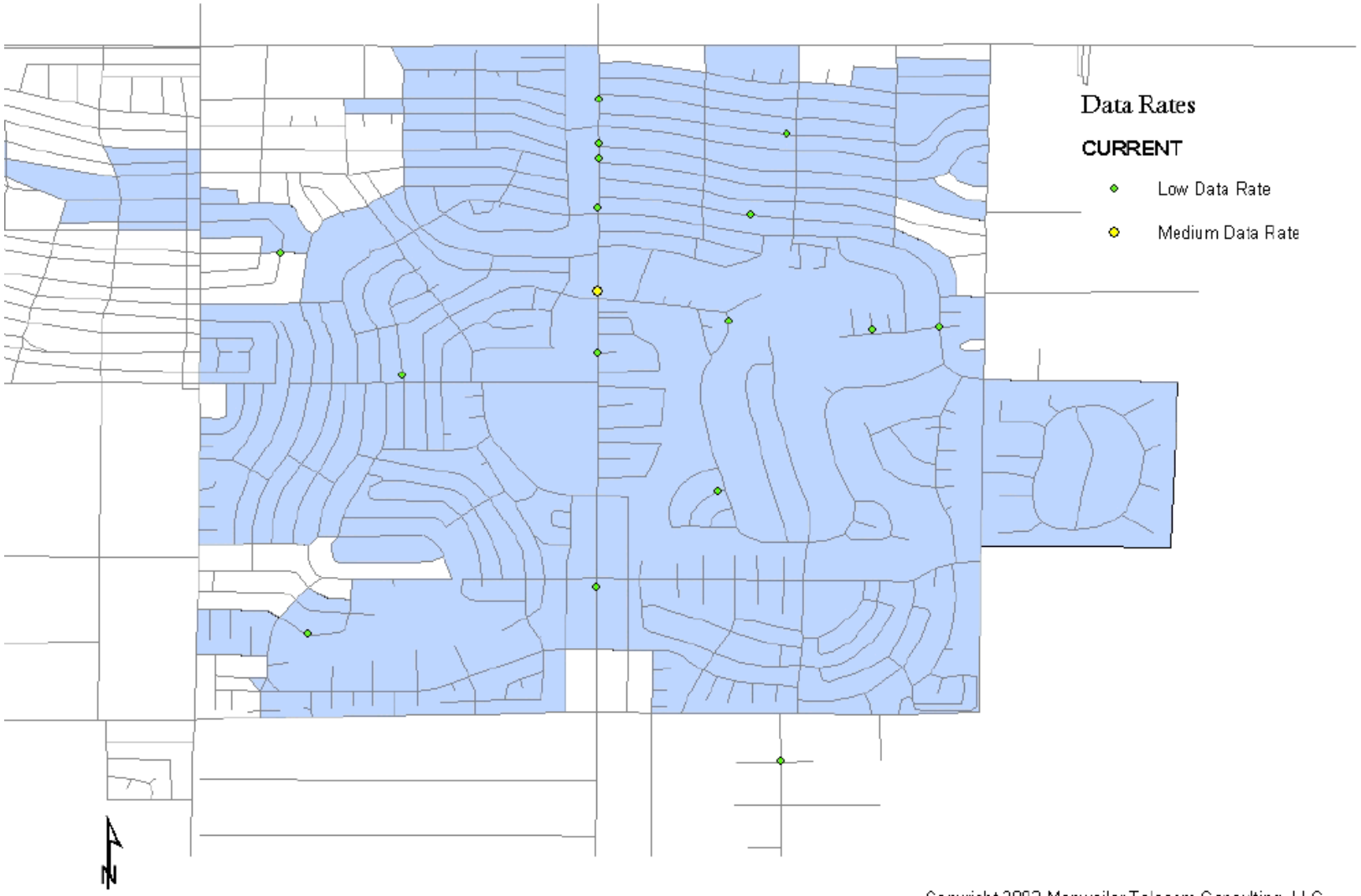

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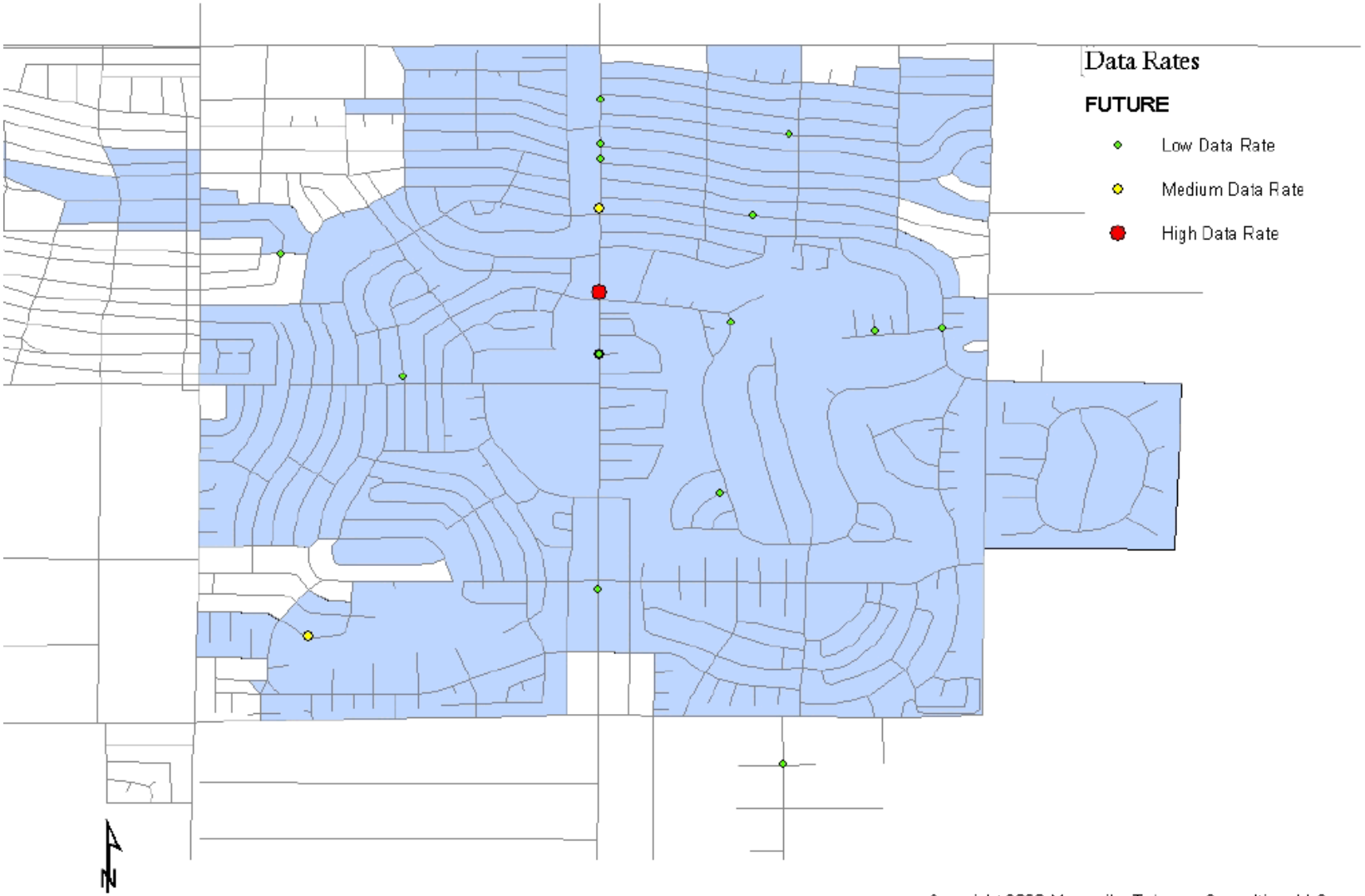

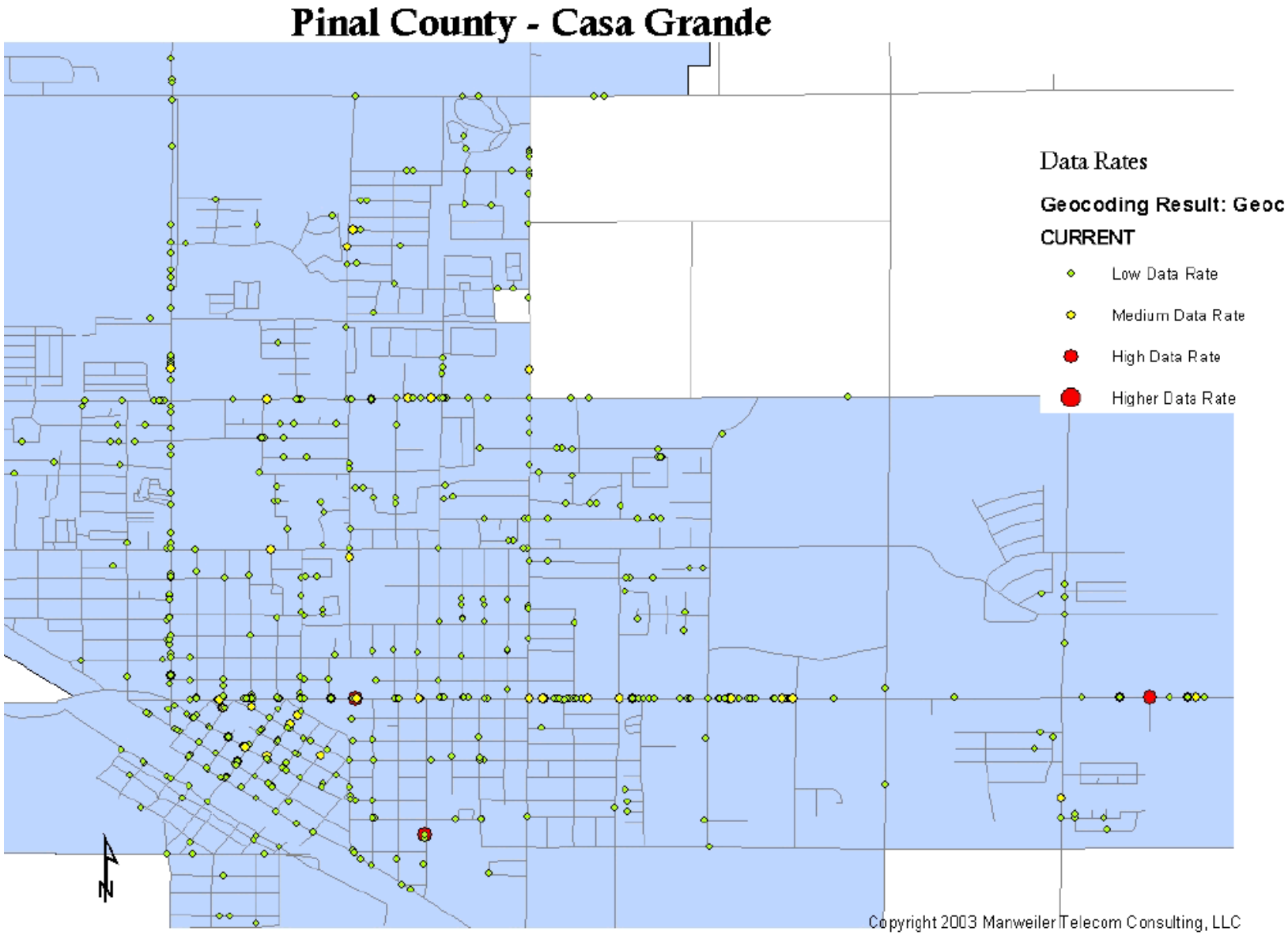
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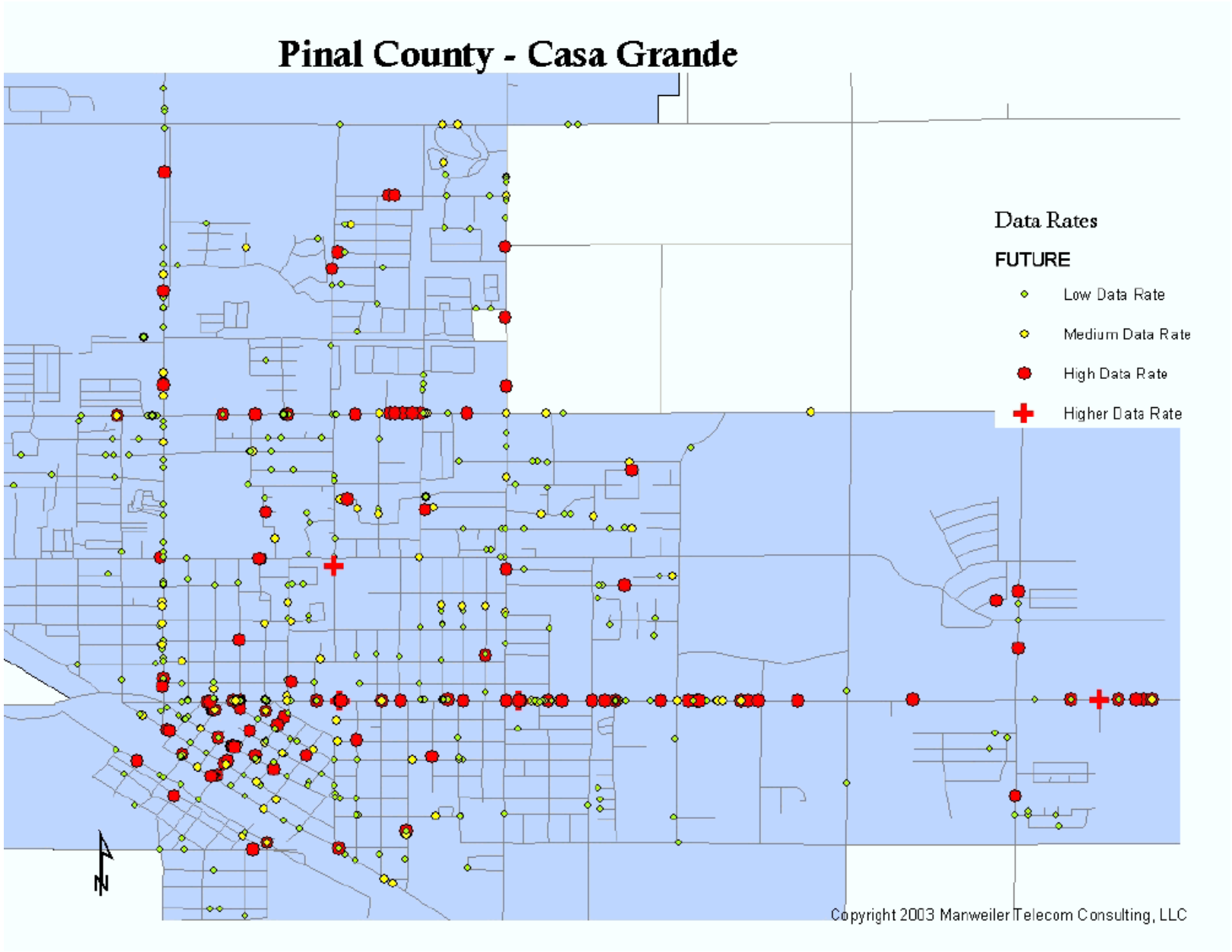
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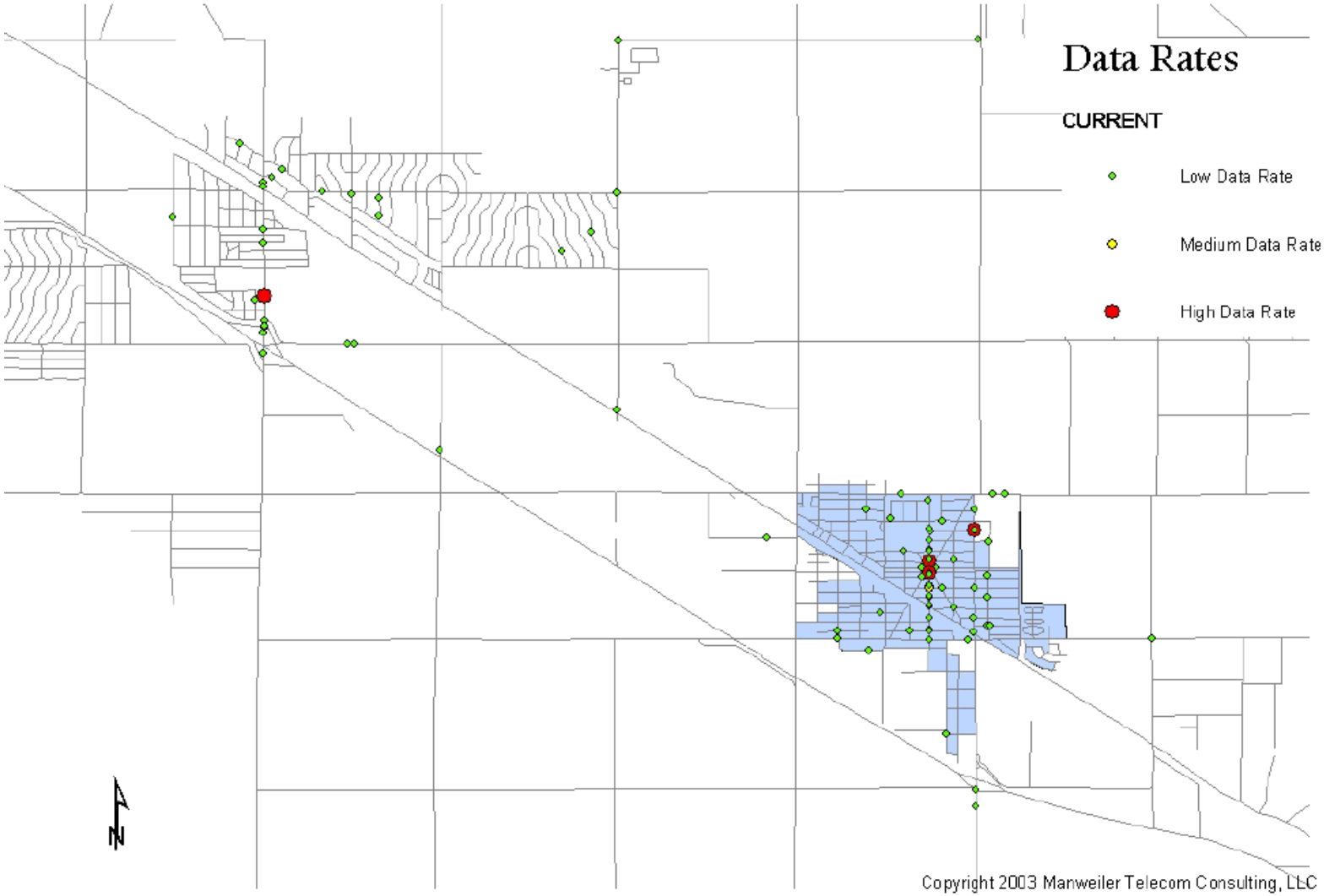

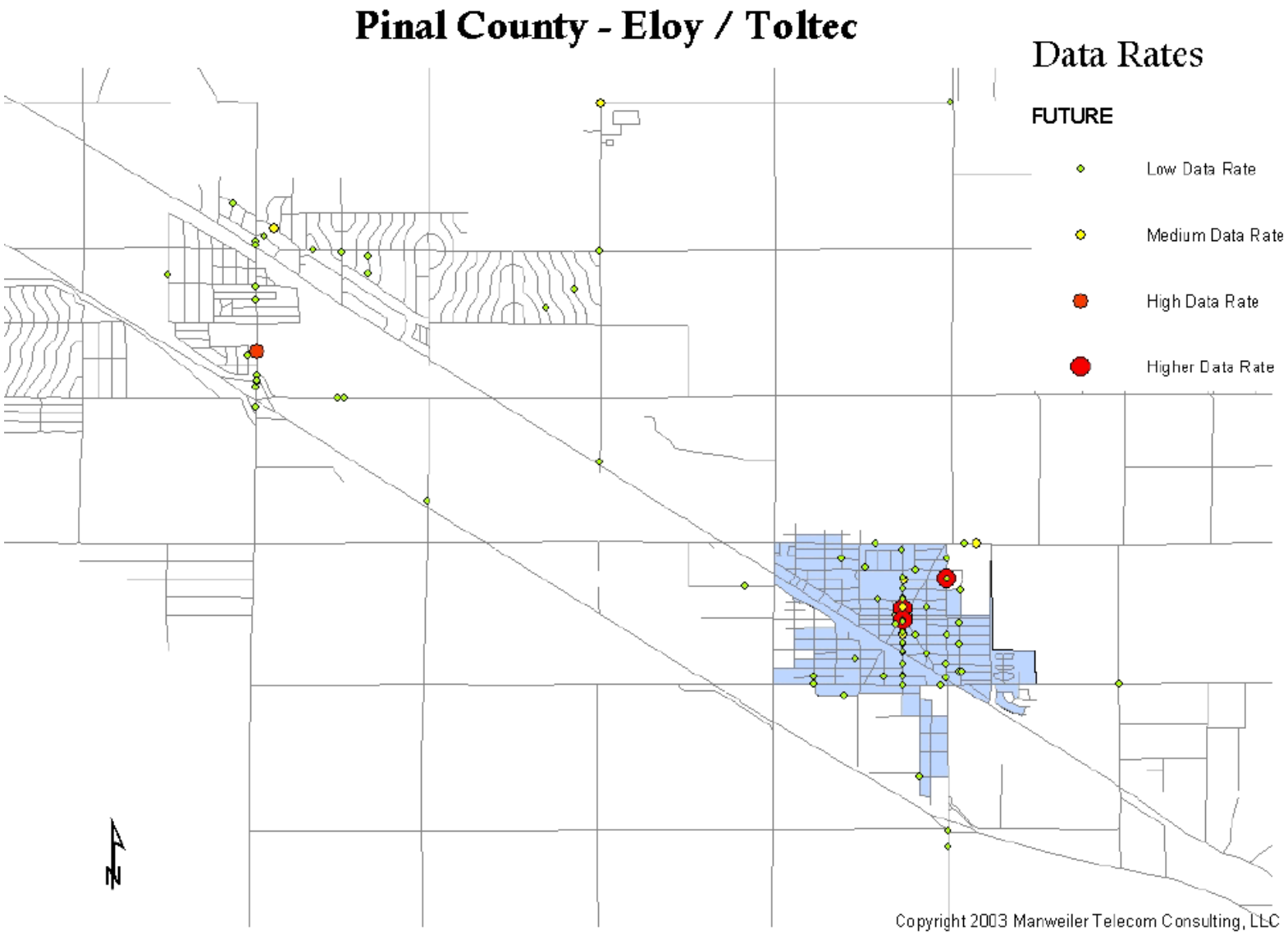
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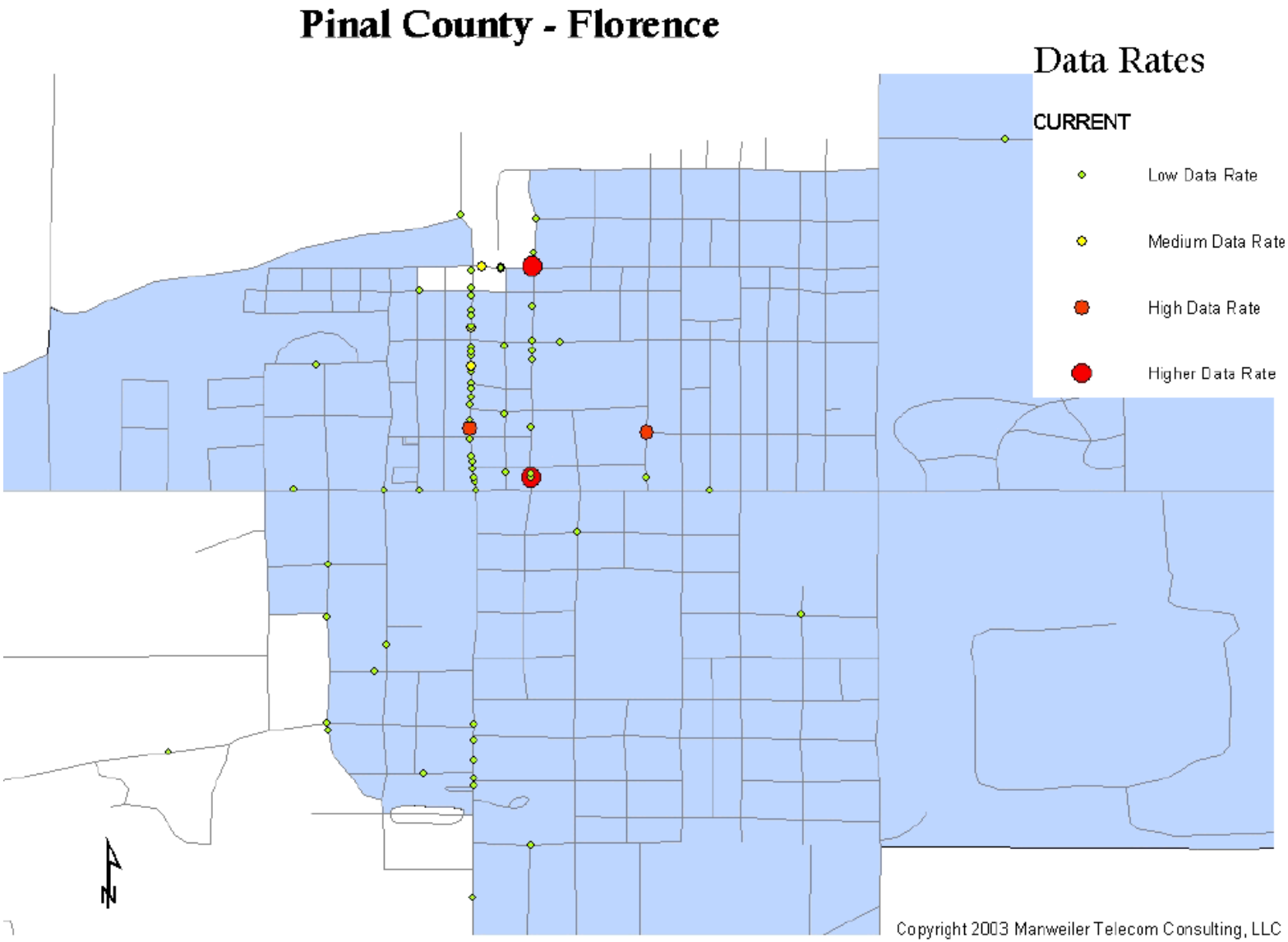
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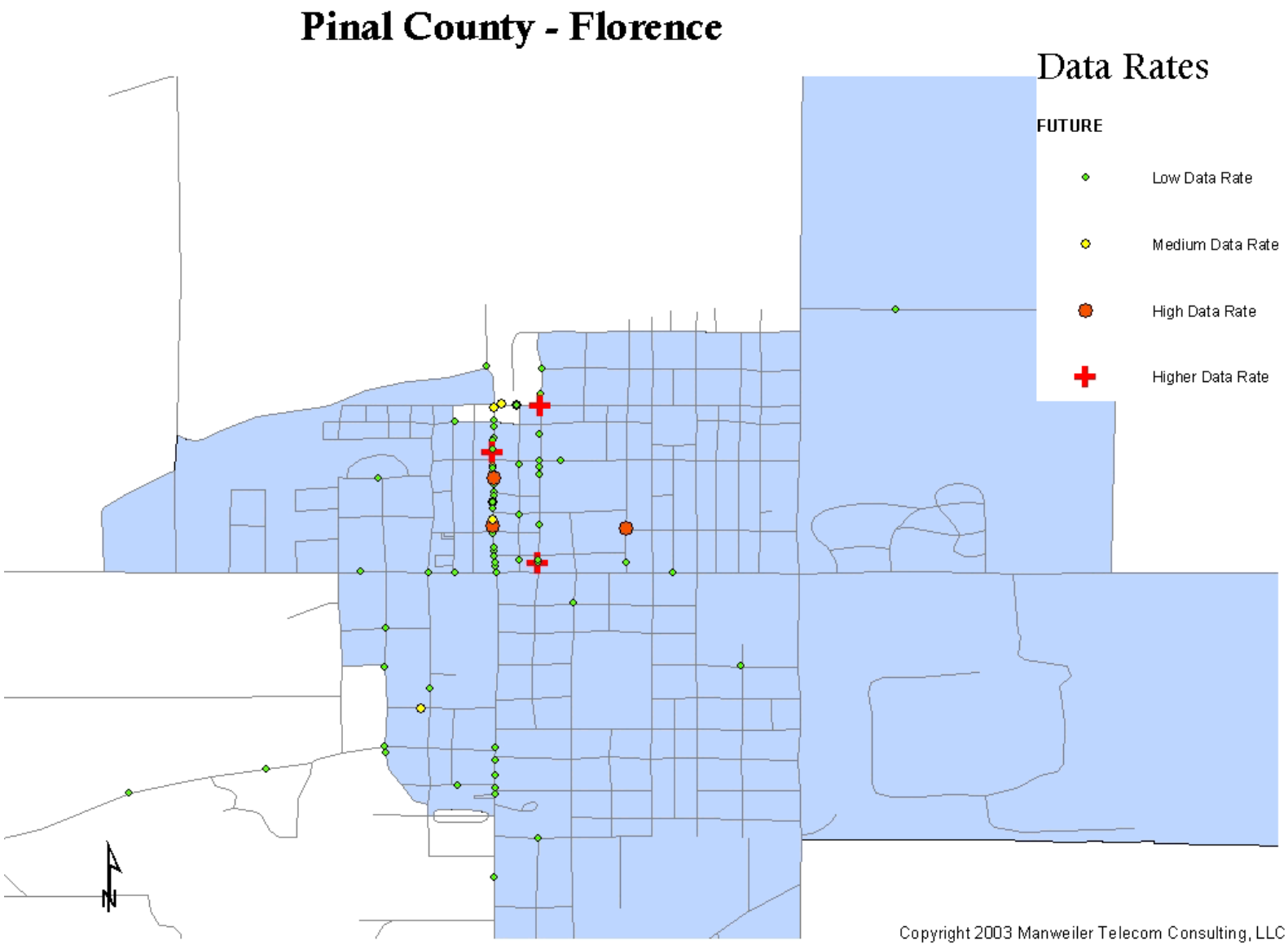
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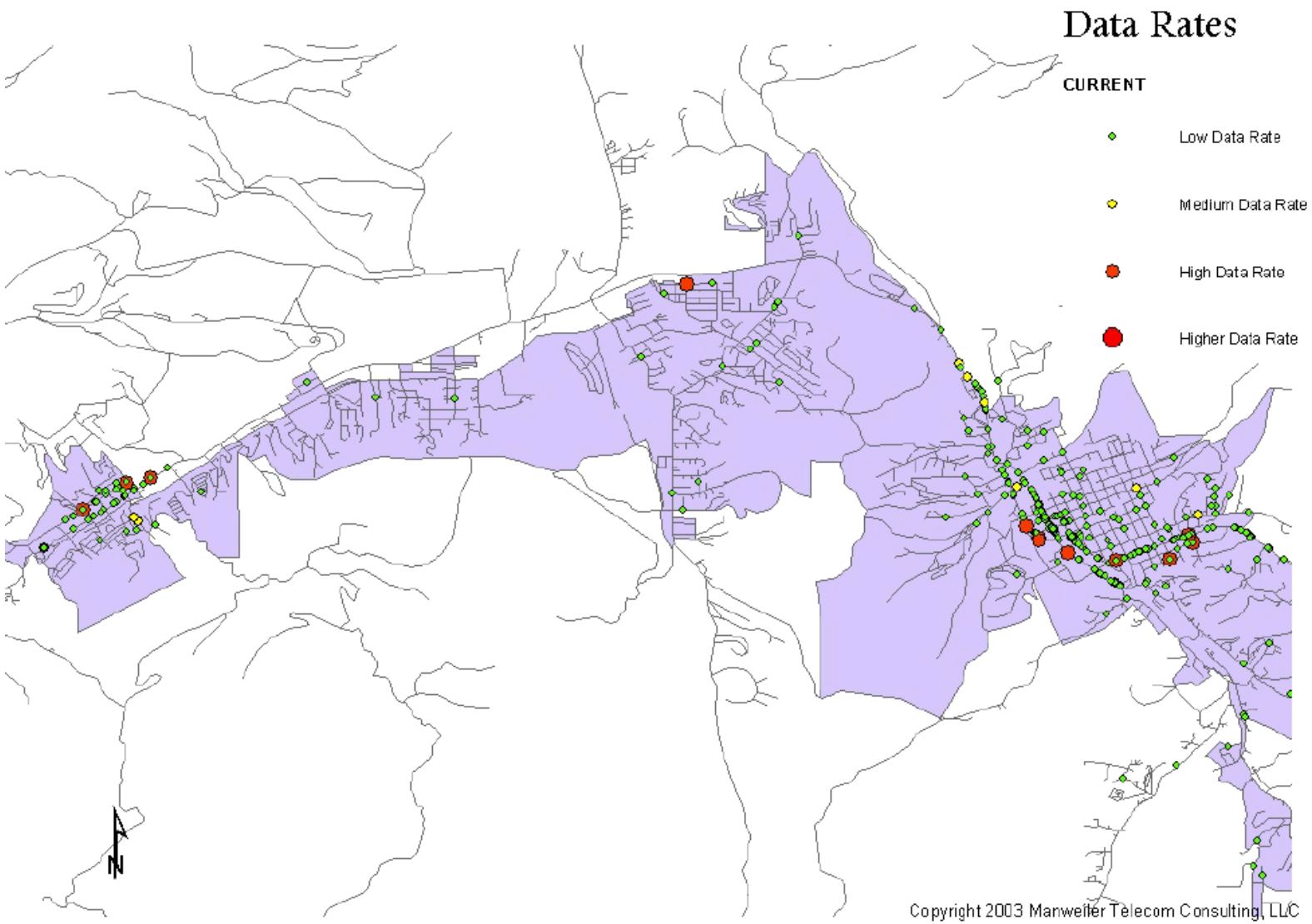

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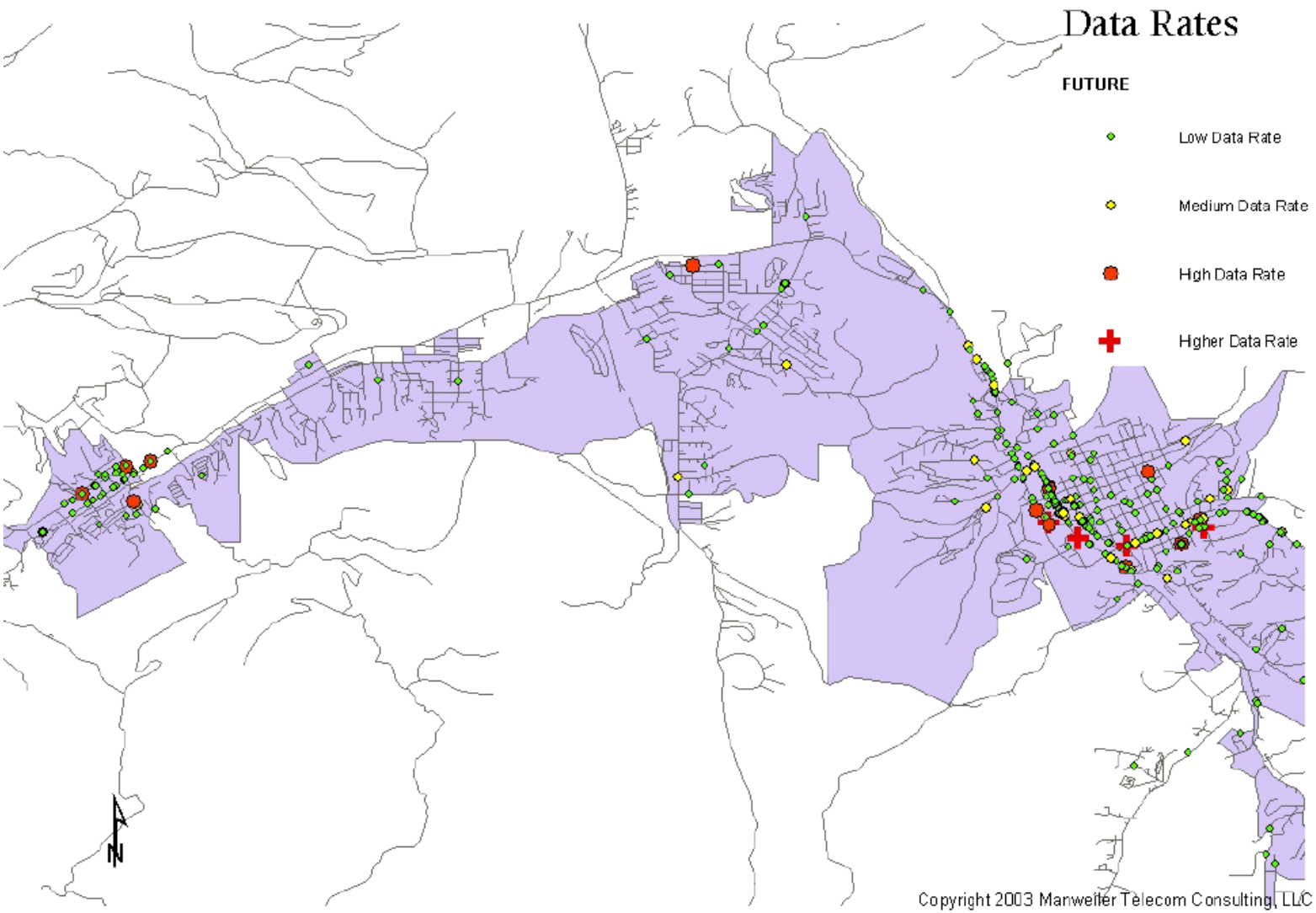

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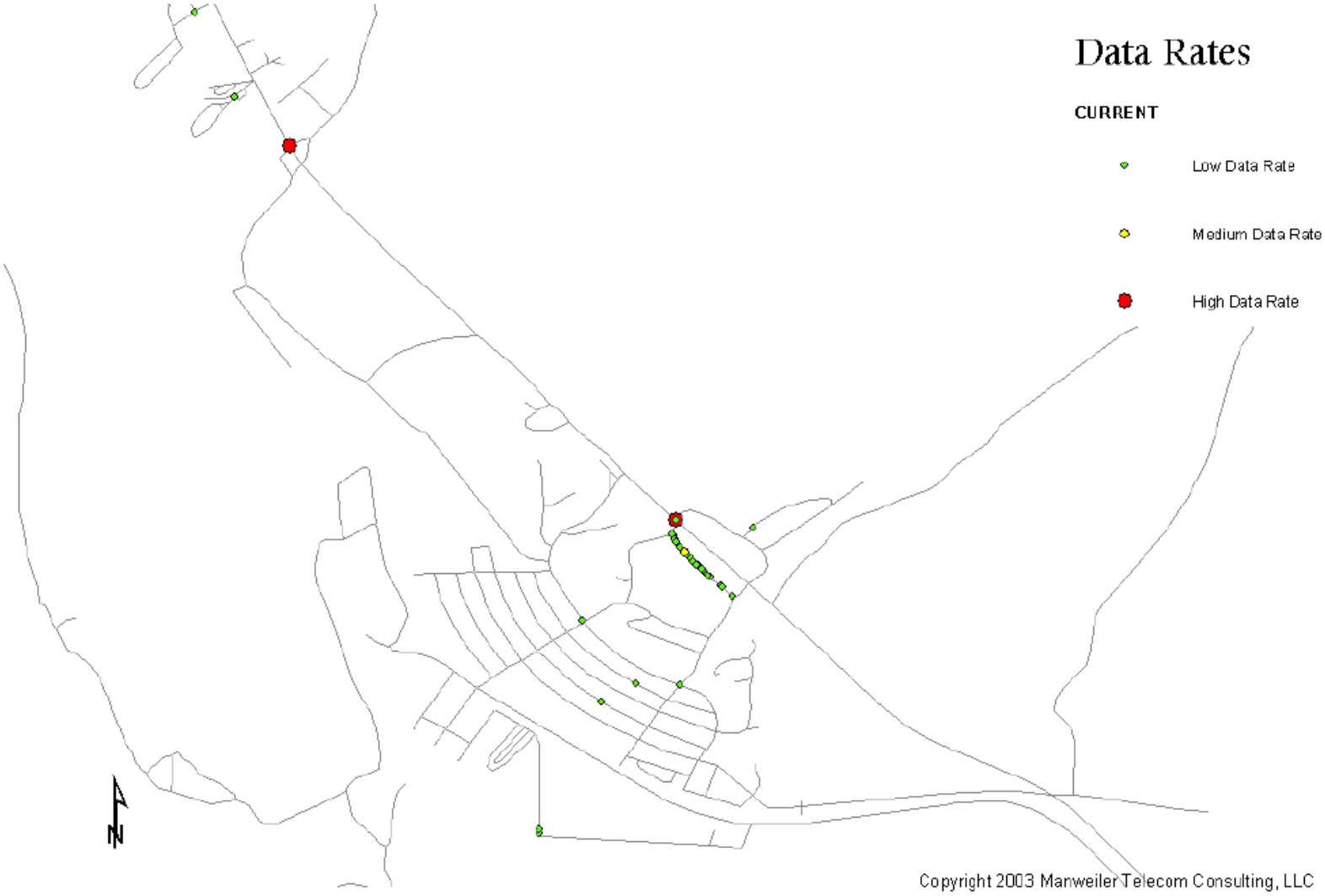

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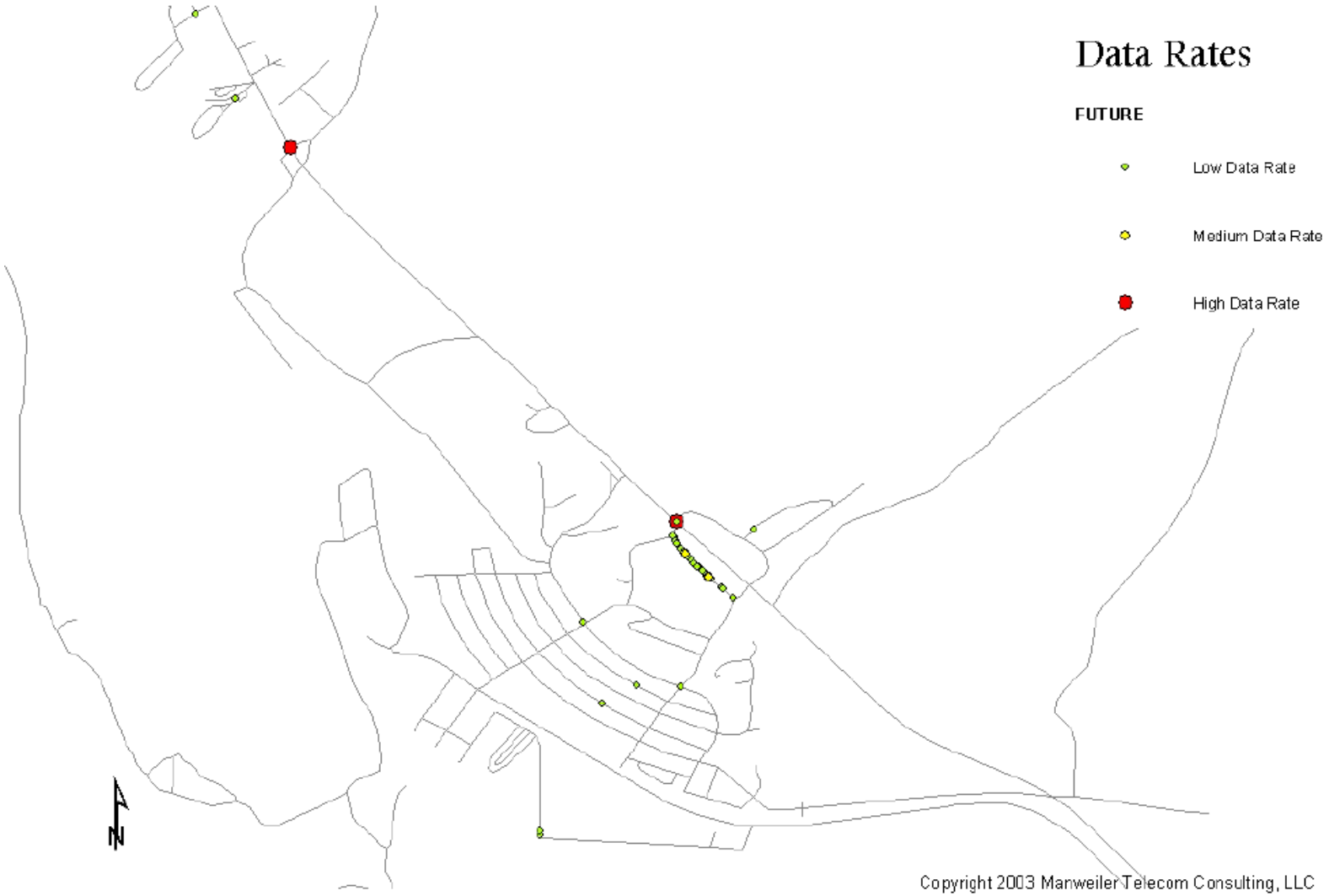

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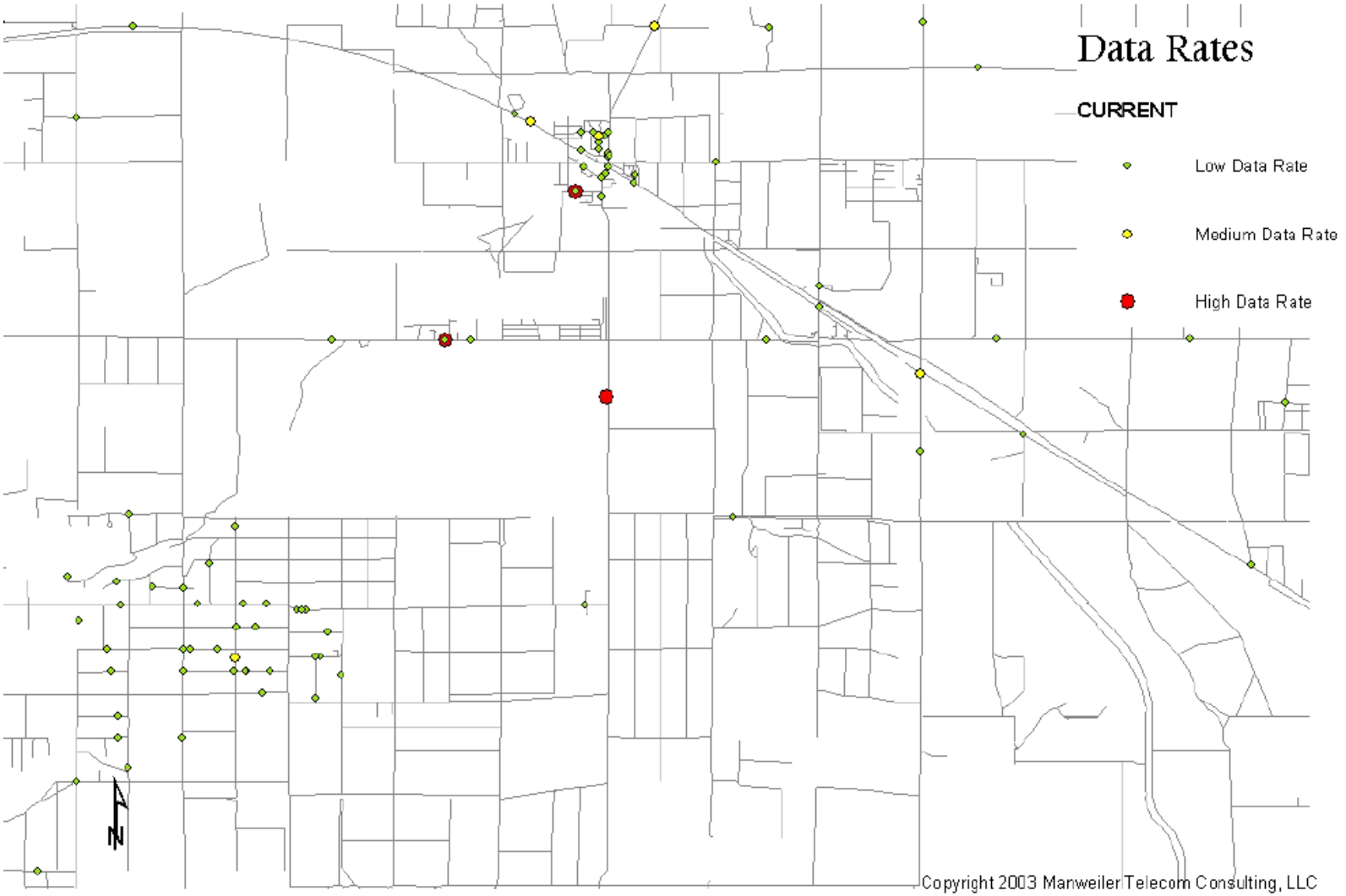

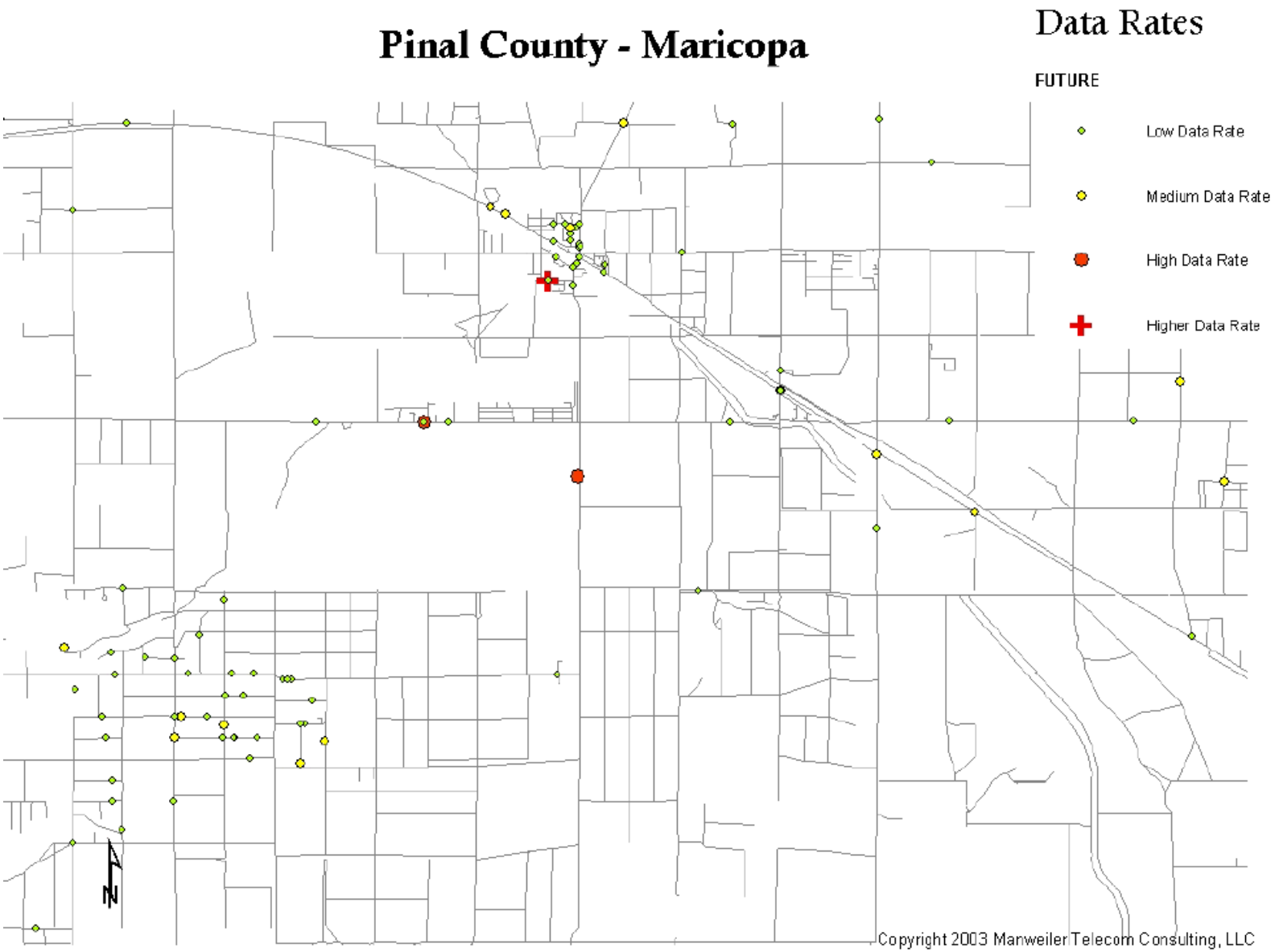
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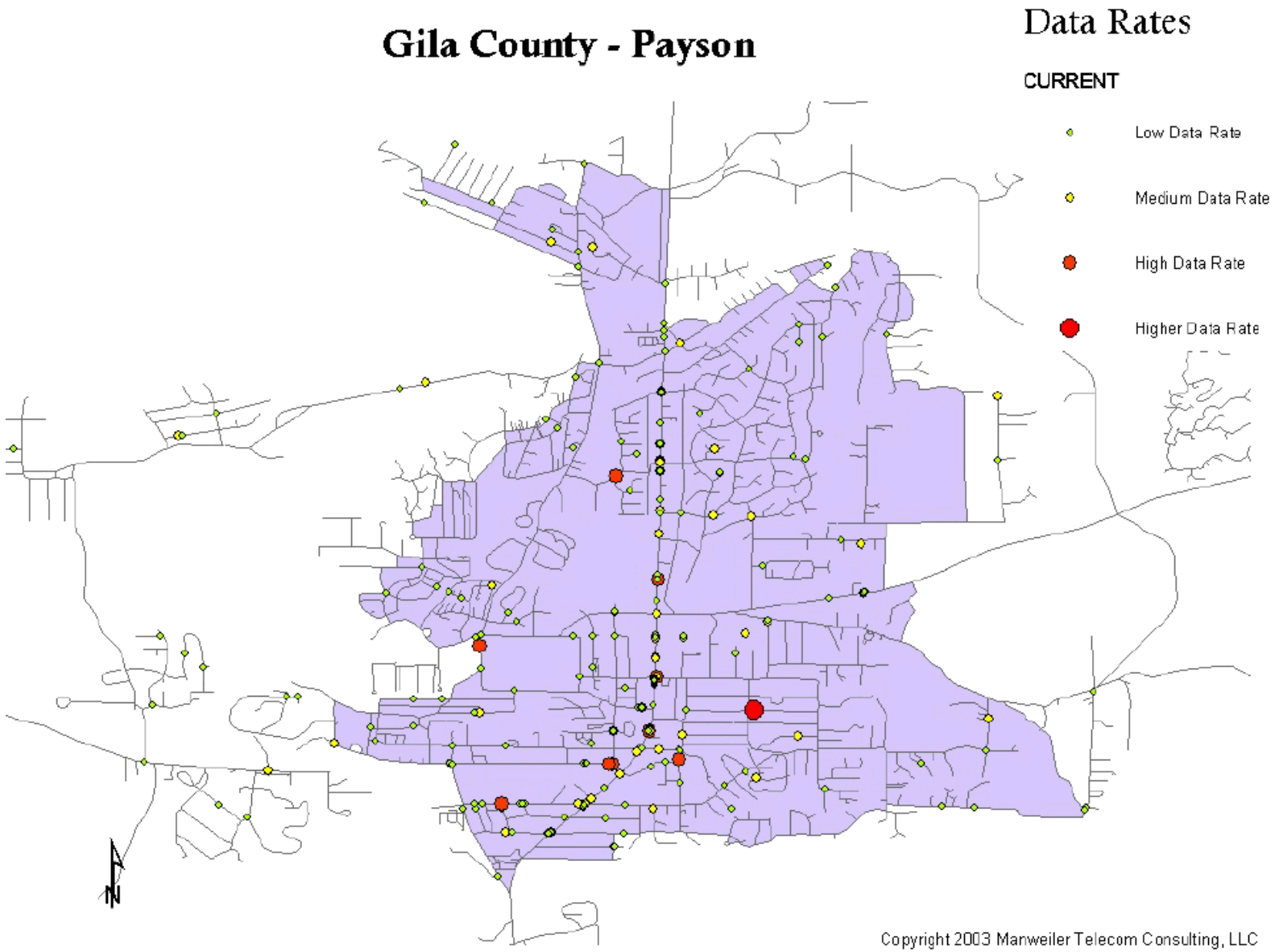
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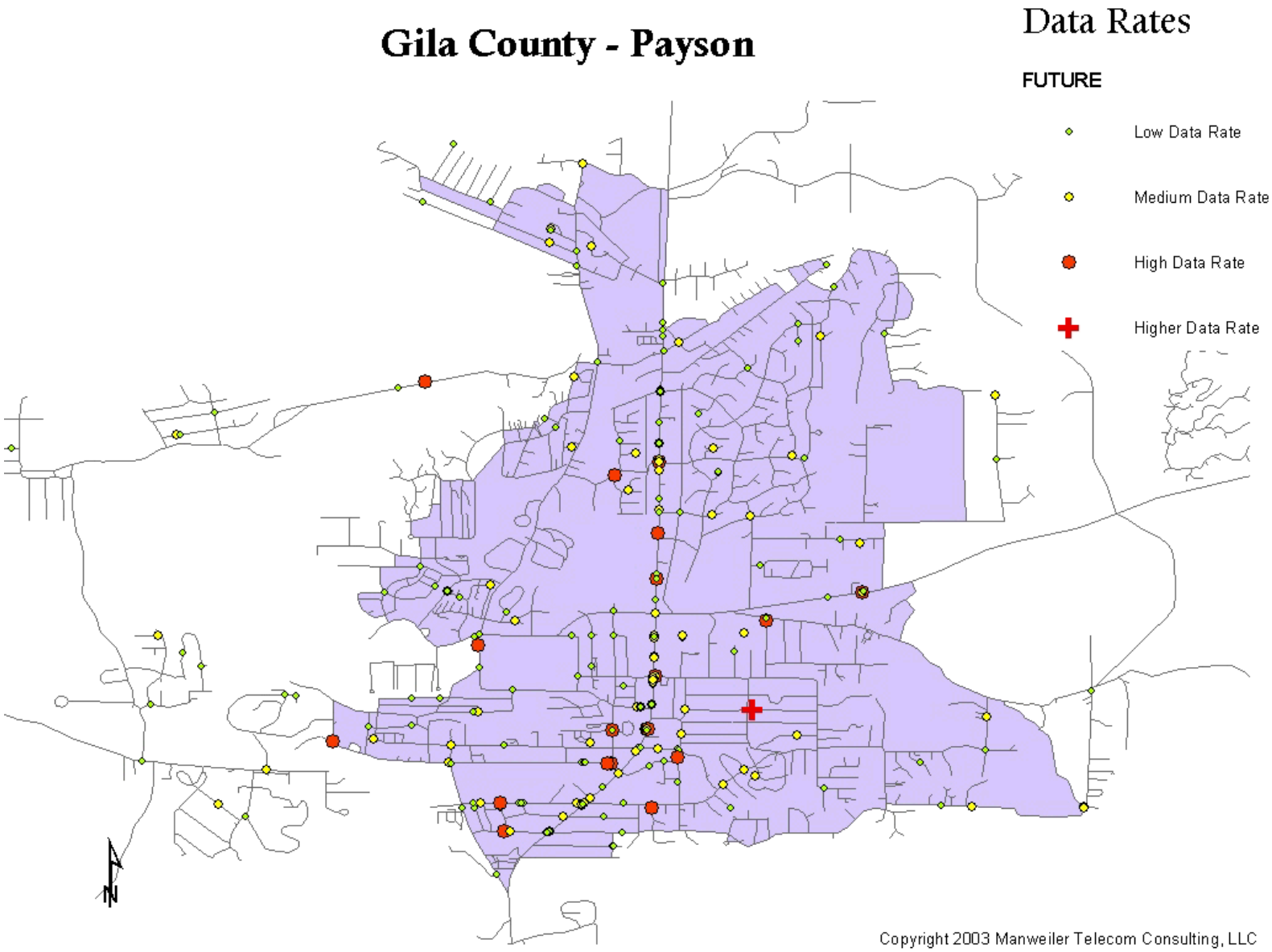
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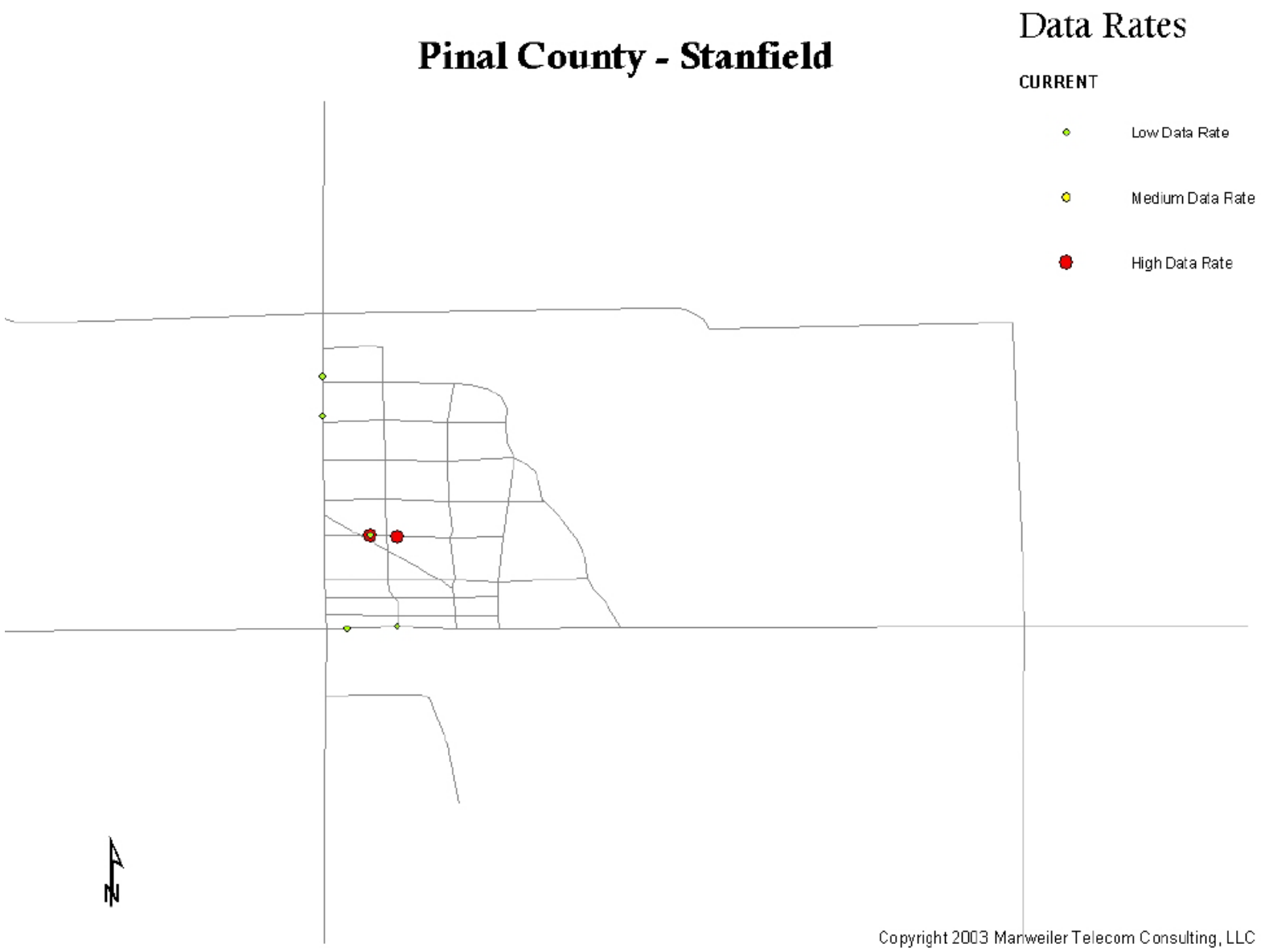
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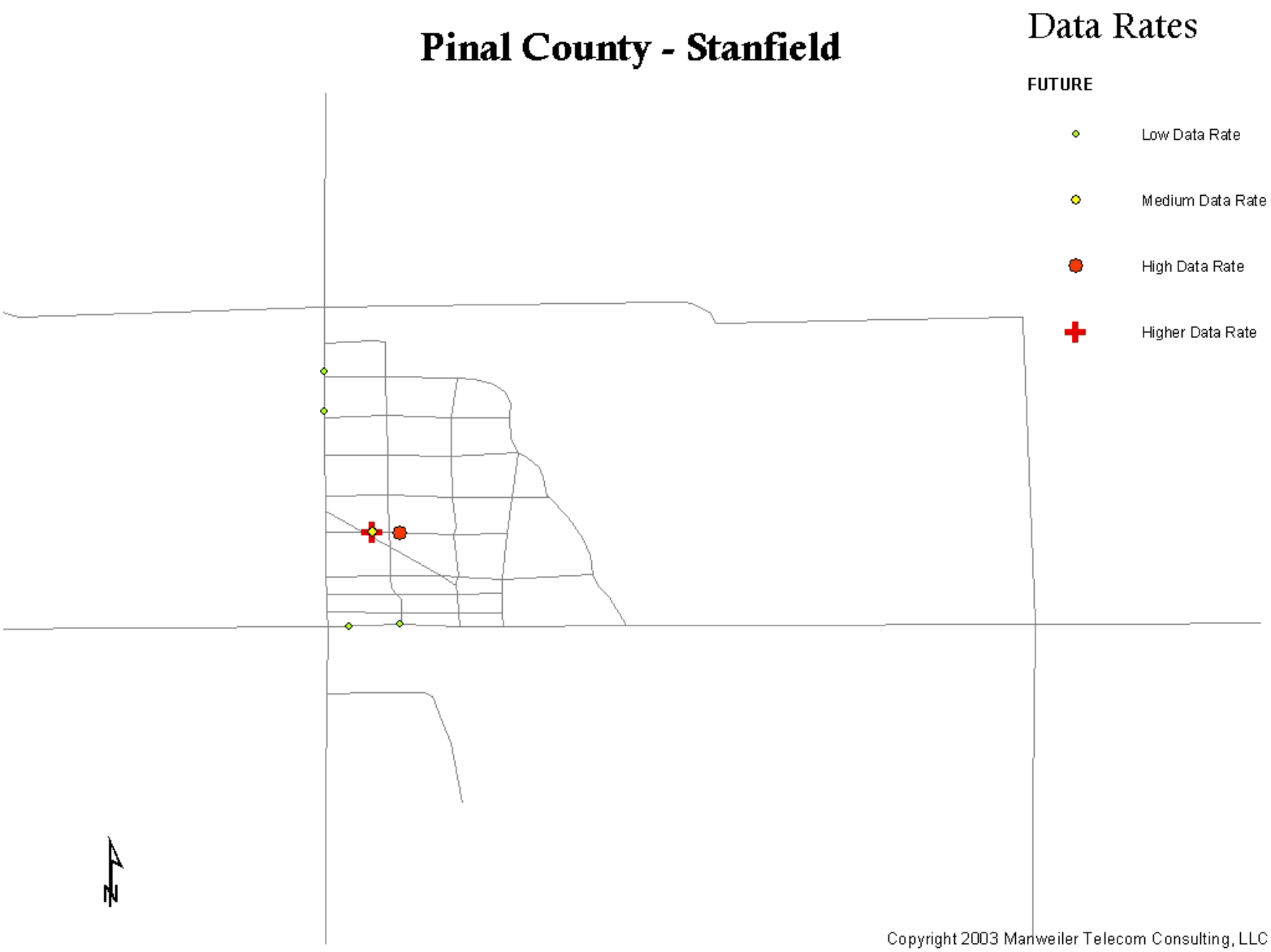
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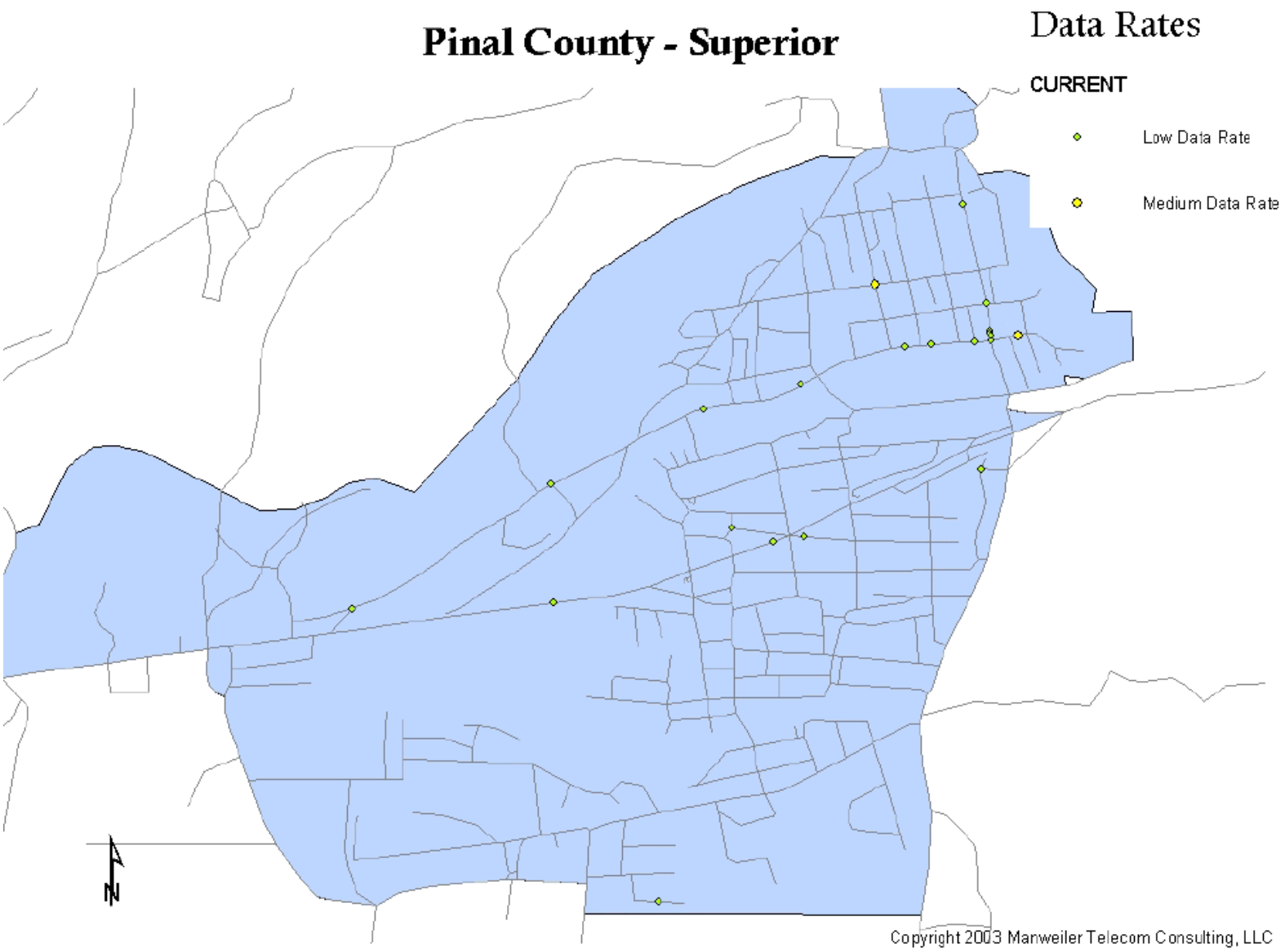
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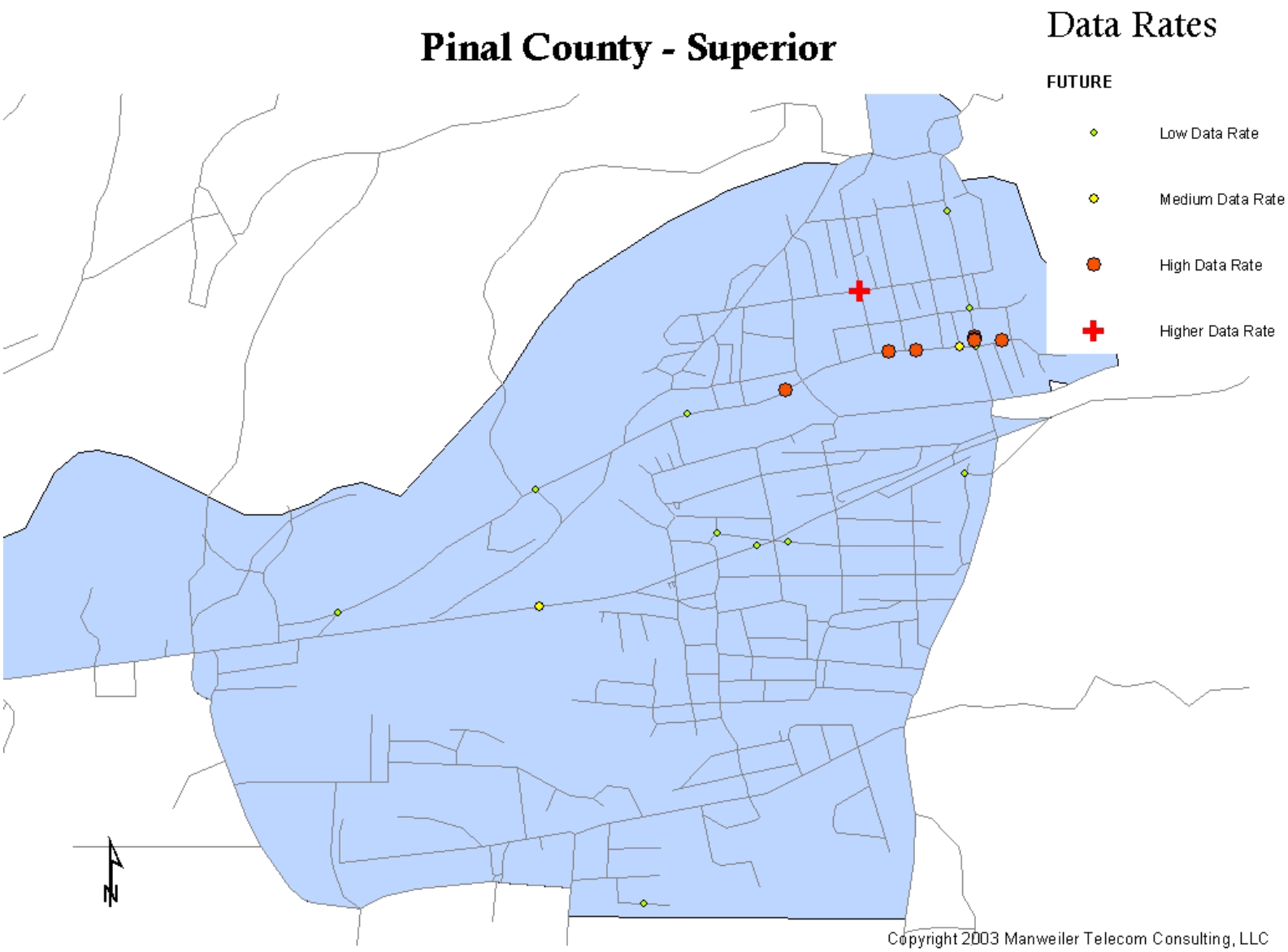
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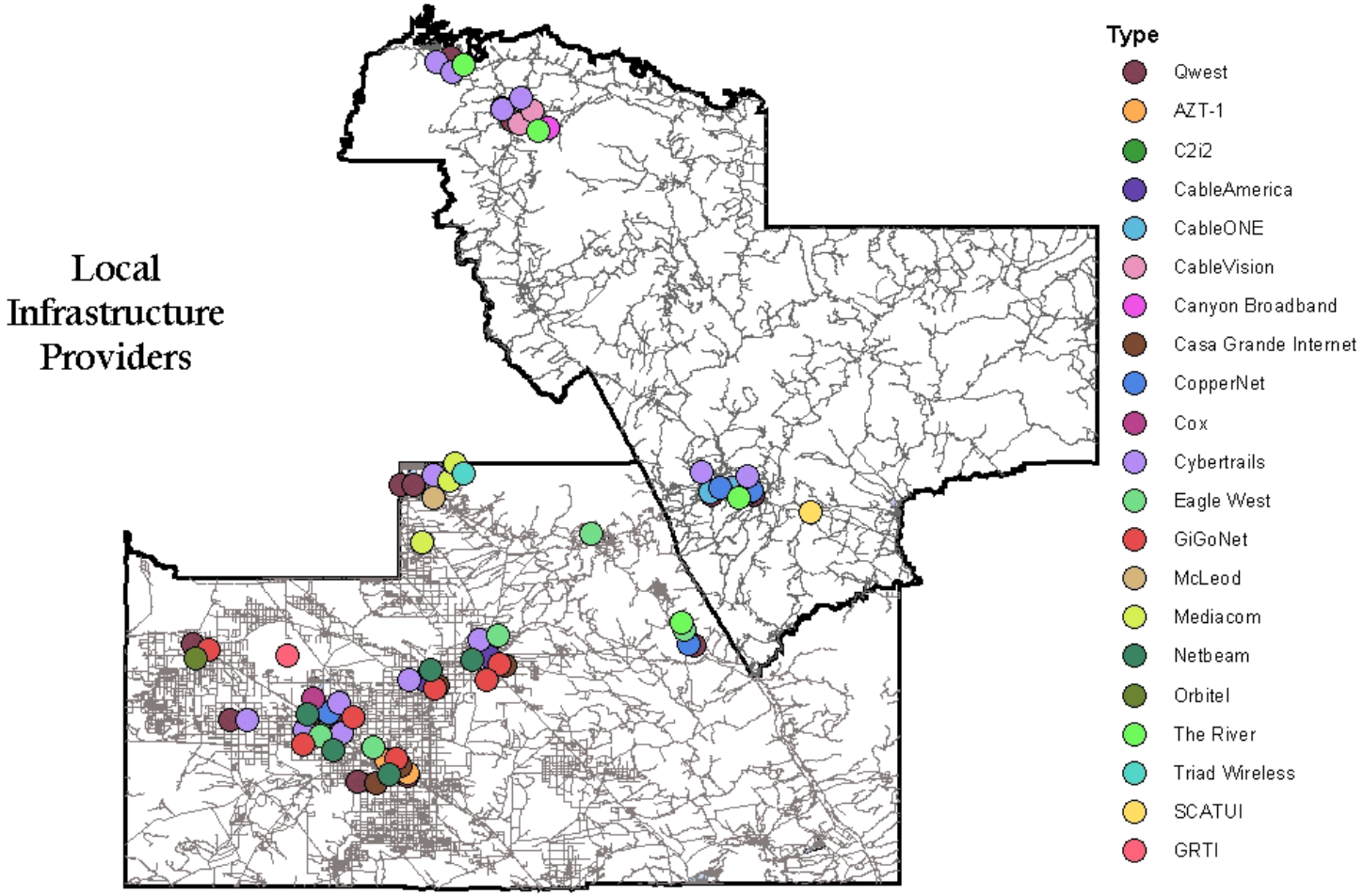
Pinal County and Gila Counties



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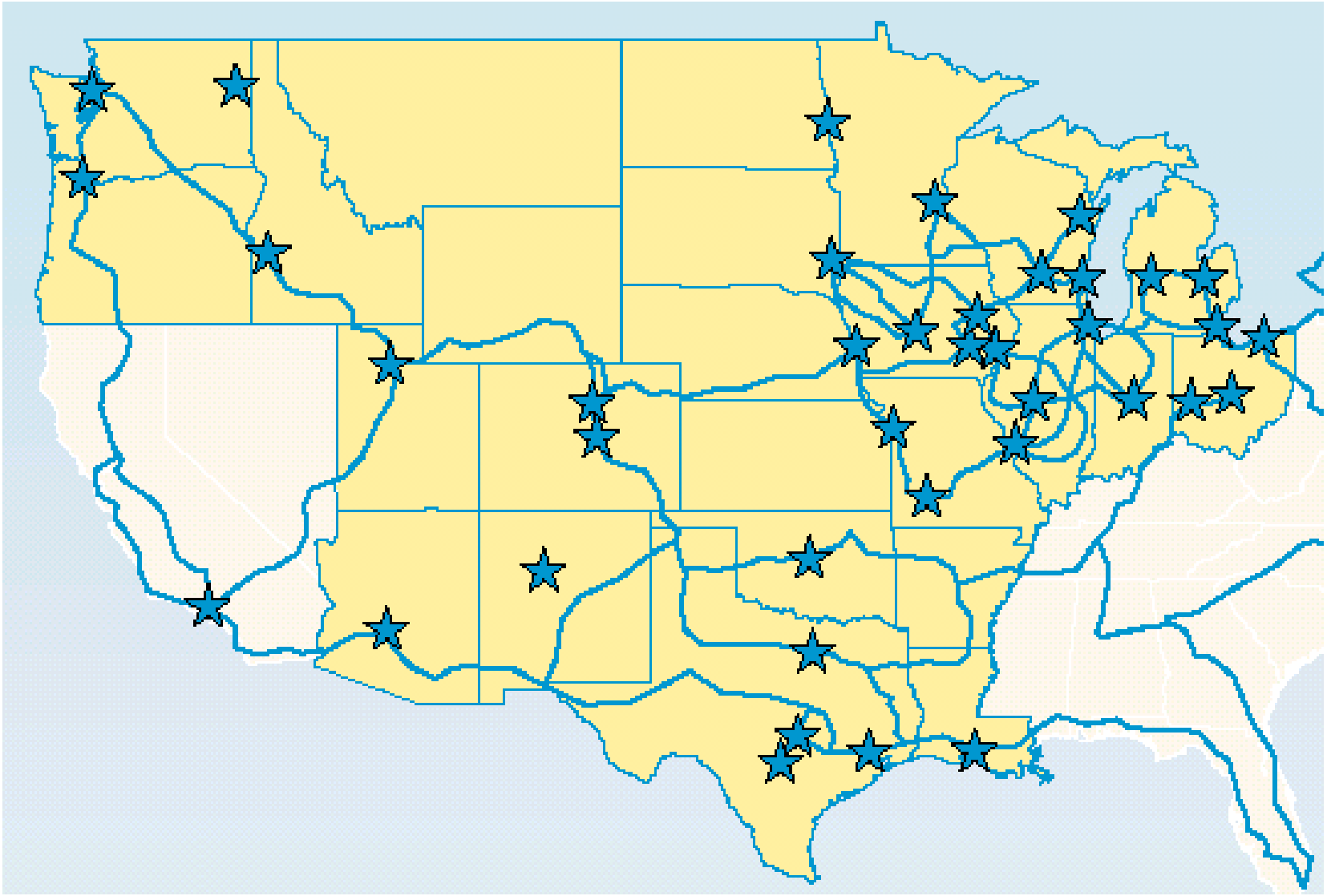

APPENDIX L – STATE TELECOM

- Statewide IT Network Diagram
- Database of Telecom Companies in Study Area

ARIZONA TELECOM COMPANIES FOR CTA CITIES File Updated:6/24/03

NPA-NXX	Company	RateCenter
520-233	AT&T LOCAL	CASAGRANDE
520-431	AT&T WIRELESS SERVICES, INC.	CASAGRANDE
520-483	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	CASAGRANDE
520-705	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	CASAGRANDE
520-709	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	CASAGRANDE
520-840	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	CASAGRANDE
928-200	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	GLOBE
928-812	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	GLOBE
928-961	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	GLOBE
928-951	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	PAYSON
928-970	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	PAYSON
928-978	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	PAYSON
520-610	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	SACATON
520-827	CELLCO PARTNERSHIP DBA VERIZON WIRELESS - AZ	SUPERIOR
520-315	GILA RIVER TELECOMM, INC.	CASABLANCA
520-430	GILA RIVER TELECOMM, INC.	MARCOPAVLG
520-562	GILA RIVER TELECOMM, INC.	SACATON
520-208	GLOBAL CROSSING LOCAL SERVCIES, INC.-AZ	CASAGRANDE
520-413	LEVEL 3 COMMUNICATIONS, LLC - AZ	CASAGRANDE
520-414	LEVEL 3 COMMUNICATIONS, LLC - AZ	CASAGRANDE
520-509	LEVEL 3 COMMUNICATIONS, LLC - AZ	CASAGRANDE
928-793	LEVEL 3 COMMUNICATIONS, LLC - AZ	GLOBE
928-462	MIDVALE TELEPHONE EXCHANGE, INC.	YOUNG
520-381	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	CASAGRANDE
520-391	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	CASAGRANDE
928-351	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	GLOBE
928-813	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	GLOBE
520-200	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	HAYDEN
928-596	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	PAYSON
928-599	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	PAYSON
520-201	MOUNTAIN TELECOMMUNICATIONS, INC. - CLEC	SAN MANUEL
520-553	NETWORK SERVICES LLC	CASAGRANDE
928-598	NETWORK SERVICES LLC	GLOBE
520-251	NEXTEL COMMUNICATIONS	CASAGRANDE
928-238	NEXTEL COMMUNICATIONS	PAYSON
928-492	PAC - WEST TELECOMM, INC. - AZ	PAYSON
520-316	QWEST CORPORATION	CASAGRANDE
520-374	QWEST CORPORATION	CASAGRANDE
520-421	QWEST CORPORATION	CASAGRANDE
520-423	QWEST CORPORATION	CASAGRANDE
520-424	QWEST CORPORATION	CASAGRANDE
520-426	QWEST CORPORATION	CASAGRANDE
520-464	QWEST CORPORATION	CASAGRANDE
520-466	QWEST CORPORATION	CASAGRANDE
520-494	QWEST CORPORATION	CASAGRANDE

520-568	QWEST CORPORATION	CASAGRANDE
520-723	QWEST CORPORATION	CASAGRANDE
520-836	QWEST CORPORATION	CASAGRANDE
520-866	QWEST CORPORATION	CASAGRANDE
520-868	QWEST CORPORATION	CASAGRANDE
520-876	QWEST CORPORATION	CASAGRANDE
928-402	QWEST CORPORATION	GLOBE
928-425	QWEST CORPORATION	GLOBE
928-473	QWEST CORPORATION	GLOBE
520-356	QWEST CORPORATION	HAYDEN
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520-363	QWEST CORPORATION	HAYDEN
928-468	QWEST CORPORATION	PAYSON
928-472	QWEST CORPORATION	PAYSON
928-474	QWEST CORPORATION	PAYSON
928-476	QWEST CORPORATION	PAYSON
928-478	QWEST CORPORATION	PAYSON
520-385	QWEST CORPORATION	SAN MANUEL
520-487	QWEST CORPORATION	SAN MANUEL
520-896	QWEST CORPORATION	SAN MANUEL
520-689	QWEST CORPORATION	SUPERIOR
520-371	QWEST WIRELESS, LLC	CASAGRANDE
928-475	SAN CARLOS APACHE TELECOMMUNICATIONS UTILITY, INC.	SAN CARLOS
520-510	SOUTHWESTCO WIRELESS, INC. - ARIZONA	CASAGRANDE
520-518	SOUTHWESTCO WIRELESS, INC. - ARIZONA	CASAGRANDE
520-560	SOUTHWESTCO WIRELESS, INC. - ARIZONA	CASAGRANDE
928-701	SOUTHWESTCO WIRELESS, INC. - ARIZONA	GLOBE
928-719	SOUTHWESTCO WIRELESS, INC. - ARIZONA	GLOBE
928-517	SOUTHWESTCO WIRELESS, INC. - ARIZONA	PAYSON
928-595	SOUTHWESTCO WIRELESS, INC. - ARIZONA	PAYSON
928-212	SPRINT COMMUNICATIONS COMPANY, L.P. - AZ	PAYSON
520-252	SPRINT SPECTRUM L.P.	CASAGRANDE
520-280	SPRINT SPECTRUM L.P.	CASAGRANDE
520-582	TIME WARNER TELECOM OF ARIZONA, LLC-AZ	CASAGRANDE
520-450	T-MOBILE USA, INC.	CASAGRANDE

APPENDIX M – GLOSSARY

GLOSSARY of Common IT Terms

ATM:
ATM (asynchronous transfer mode) is a dedicated-connection switching technology that organizes digital data into 53-byte cell units and transmits them over a physical medium using digital signal technology. Individually, a cell is processed asynchronously relative to other related cells and is queued before being multiplexed over the transmission path. Because ATM is designed to be easily implemented by hardware (rather than software), faster processing and switch speeds are possible. The pre-specified bit rates are either 155.520 Mbps or 622.080 Mbps. Speeds on ATM networks can reach 10 Gbps. Along with Synchronous Optical Network (SONET) and several other technologies, ATM is a key component of broadband ISDN (BISDN).

(ATM also stands for *automated teller machine*, a machine that bank customers use to make transactions without a human teller)

Analog:
Way of sending data in which the signal is similar, or analogous, to the original signal. Analog signals are continuous expressions of electricity, as opposed to digital signals in which there is an alternating absence and presence of signal.

Architecture:
Arrangement and design orchestrating the interaction of different elements of a complex communications system.

Asynchronous:
Transmission method in which information is transferred one discrete character at a time and is delineated by a start and stop indicator at the beginning and end of the character. The opposite of asynchronous is *synchronous* transmission.

Analog Mobile Wireless:
Voice and data services that are transmitted over networks using analog protocols to people using wireless devices that do not require staying at a fixed location.

Backbone:
Part of the communications network that carries the heaviest traffic. It joins the LAN using a bridge or a router and serves as a communications highway for LAN to LAN traffic. It is also a basis of design for the overall network.

Bandwidth:
The capacity of a transmission channel to move data among locations.

Bit:
Smallest unit of digital information utilized by electronic or optical information processing, storage and transmission systems. Bit is shorthand for *binary digit*. Binary technology is based on the representation of data using 1's and 0's in combinations to create a protocol medium for data transmission.

Bits per Second (bps):
How many *binary digits* (pieces of data) are transmitted per second? Common speeds include:

2400 bps amounts to two average sentences sent per second
28.8 kbps seven minutes for a 300 page book
64 kbps about 1⅔ pages per second (also known as ISDN speed)
1.544 Mbps (Megabits per second) sends a 300 page book in about 1⅜ minutes – gives VCR quality video and is also approximate speed for DSL, T-1 or DS-1 lines
30 Mbps Speed of most cable modems
45 Mbps Speed of T-3 or DS-3 connections
155 Mbps OC-3 line speed – transmits 14 books (300 pages each) per second
80 Gbps (Gigabits per second) Speed of most fiber optic backbones – capable of transmitting 7,000 books (300 pages each) in one second. (That's 3.1 million books in an hour or 75 million books in a single day!)

BOC:
Bell Operating Company – the local Bell Telephone company, also called "Baby Bells" which were operating units of the original, and monopoly, Bell Telephone Company (aka "Ma Bell"). Currently there are 22 BOCs that are owned by (organized into) seven Regional Bell Operating Companies (RBOC).

Bridge:
Data communications devise that connects two or more network segments and moves data between them.

Broadband:
Typically refers to communication or data transmission using fiber optic networks, but can also be defined as data transmission speed greater than 45 Mbps (T-3 line speed).

Byte:
Smallest unit of information that a computer system can locate within its data storage or memory. A byte consists of eight (8) bits and represents an amount of information roughly equivalent to a single printed or typewritten character. A byte is bigger than a bit.

CCITT:
Consultative Committee on International Telegraph and Telephone – this is the international standards issuing entity for digital telecom networks. They establish guidelines and standards for things like ISDN.

CLEC:
Competitive Local Exchange Carrier – refers to a company that competes with the BOC for provision of local telephone service to customers. Often these companies are existing long distance, internet service or cable service providers. Term was originally coined for the deregulated, competitive telecommunications environment touted by the federal Telecommunications Act of 1996.

Cable:
Cable TV network comprised of fiber and/or coaxial cable. Modern cable networks can use cable modems to enable two-way high-speed Internet access.

Cable Modem:
Small electronic device that allows a computer to access the internet via a local cable provider. Typically have faster speeds than telephone (dial-up) modems. (See modem)

Central Office:
Often referred to as the CO, term applies to phone company location of switches and other network distribution, transmission equipment.

Connectedness:
The measure of how well connected to the Internet a person is.

DSL:
Digital Subscriber Line service provides high speed Internet access over traditional copper telephone infrastructure and is usually available only to locations within 18,000 wire feet of a local exchange carrier's central office.

Data Compression:
Technique used to decrease the amount of computer memory space or transmission resources required to handle a given amount of data. Usually achieved through the applications of mathematic algorithms to the data transformation process.

Dial-up Internet access:
Obtaining connectivity to the Internet by using a modem and standard telephone line to connect to an Internet Service Provider or other provider of Internet service. Maximum access speed is 56kbps.

Digital:
Use of binary code to represent information. This type of signal can be replicated precisely which is beneficial in transmissions involving long distances where the signal may lose strength along the way, picking up static and other interference. Instead of merely amplifying the signal (like analog does), the code is 'filtered' to delete the noise and then transmitted. An additional benefit is that digital technology is becoming cheaper and more powerful, while analog technology is becoming outdated.

Digital Signature:
An authentication process using encryption to ensure that a communication that has been received has not been tampered with.

Digital Switch:
Connection device in which binary encoded information is routed between input/output ports by means of time diversion multiplexing rather than by dedicated circuits.

Ethernet:
Local area data communications network, originally devised by Xerox Corp.. The network accepts transmission from computers and terminals.

Fiber:
Refers to communications transmission lines made of ultra-pure glass. It carries a digital signal made of modulated light. It is capable of carrying more data, at much faster speeds, than traditional copper phone lines. (See optical fiber)

Firewalls:
A software process for protecting undesired access to a network or access device.

Fixed Wireless:
Service that is provided wirelessly to a device that is located in a single place and not mobile.

Head-end:
Term commonly used in the cable industry to refer to a distribution site or piece of equipment that sends signals to multiple users over a geographic area. Similar to the Central Office (CO) of a BOC or CLEC.

High-speed Access:
Access to the Internet at transmission speeds greater than 128kbps.

IEEE:
Institute of Electrical and Electronics Engineers, Inc - IEEE is a non-profit, technical professional association of more than 380,000 individual members in 150 countries. Through its members, the IEEE is a leading authority in technical areas ranging from computer engineering, biomedical technology and telecommunications, to electric power, aerospace and consumer electronics, among others.

ILEC:
Incumbent Local Exchange Carrier – applies to the BOCs and small independent telephone providers who provide local telephone service to customers.

ISDN:
Integrated Services Digital Network – a switched network that provides end-to-end digital connectivity for simultaneous transmission of voice and/or data over multiple, multiplexed

communications channels. ISDN uses transmission and out-of-band signaling protocols that conform to internationally defined standards (set by the CCITT).

ISP:
Internet Service Provider. A company or organization that provides a user with a connection for their computer to the Internet.

IT:
Information Technology – general term applied to most aspects of any type of communications system, mode, network or equipment used to transmit data (information) from one point to another.

Informational Websites:
Websites that only present information - do not allow for any interactivity or transactions.

Interactive Websites:
Websites that enable real-time communication and/or transactions between the user and the website.

Kbps:
Kilo bits per second. A measurement of the rate of speed that data is being transferred. 1Kbps equals 1,000 bits per second.

LAN:
Local Area Network – a geographically localized network that consists of both hardware (computers) and software (programs). A LAN links peripheral devices (computers, workstations, printers) . LANs are usually limited to an individual building or group of buildings and is under some sort of formal control.

LATA:
Local Access Transport Area – the geographic area within which telephone calls can be handled without going through a long distance carrier (like AT&T, Sprint or MCI). Calls across LATA boundaries (which were established in a federal court proceeding in 1984) must go through a long distance phone company. LATA lines also provide a way of determining where BOCs can offer service and were the means of determining how the assets of the original Bell Telephone Company were divided between the BOCs and AT&T. These are not the same as area codes.

Last Mile:
Term referring to the challenges of delivering service (local phone, long distance, cable or broadband) to the final destination. In some circles, this is referred to as the “first mile”. In many cases, especially in rural locations, the last mile infrastructure, if it exists, is old and has limited capacity to support newer, faster modems and computers.

Local Loop:
Usually a physical line (often copper), it is the communication channel between a customer's location and the service provider's central office. It is also called a subscriber loop, especially by the cable industry.

Local Number Portability:
Ability to change phone companies (local exchange carriers) without having to change phone numbers.

Microwave:
A transmission method that employs use of electromagnetic waves in radio frequencies above 890 MHz and below 20 GHz. Electromagnetic waves travel only in straight lines and are used for communications between satellites and towers. Use may be limited in mountainous terrain and under certain climactic conditions.

Mobile Digital Wireless:
Voice and data services that are transmitted over networks using digital protocols to people using wireless devices that do not require staying at a fixed location. Commonly referred to as cell phone service.

Modem:
Stands for MOdulator-DEModulator – electronic device that allows computers to communicate over standard telephone lines. The device transforms a digital signal into an analog signal and transmits the signal to another modem which then reconstructs the digital signal from the analog signal.

Network:
System designed to provide access path(s) for communications between users at different geographic locations. Usually includes elements for voice, data, facsimile images and/or video images.

Network Infrastructure:
The physical plant of wires, switches, routers, hubs, satellites, broadcast towers, dishes, and other hardware that allow communications signals to be delivered across networks.

OC-1:
Optical Carrier level one - a set of signal rate multiples for transmitting digital signals on optical fiber. The base rate (OC-1) is 51.84 Mbps. Asynchronous transfer mode (ATM) makes use of some of the Optical Carrier levels.

OC-3:
Optical Carrier level 3 – transmission rate is 155.52 Mbps.

Optical Fiber:
Optical fiber (or "fiber optic") refers to the medium and the technology associated with the transmission of information as light pulses along a glass or plastic wire or fiber. Optical fiber carries much more information than conventional copper wire and is in general not subject to

electromagnetic interference and the need to retransmit signals. Most telephone company long-distance lines are now of optical fiber. Transmission on optical fiber wire requires repeaters at distance intervals. The glass fiber requires more protection within an outer cable than copper. For these reasons and because the installation of any new wiring is labor-intensive, few communities yet have optical fiber wires or cables from the phone company's branch office to local customers (see Local Loop). A type of fiber known as single mode fiber is used for longer distances; multimode fiber is used for shorter distances.

PANS:
Pretty Amazing New Stuff(Services) – often referred to as ISDN or broadband capacity.

POP:
Point of Presence – refers to an actual physical location where a service provider has the ability for network access. Mostly used to indicate an access point to the internet.

POTS:
Plain Old Telephone Service – refers to simple voice telephone communications without any added features like call waiting, voice mail or caller ID.

Packet-switched Data Transmission Service:
A service that provides for the transmission of data in the form of packets, switches data at the packet level, and may provide for the assembly and disassembly of data packets.

Point-to-Multipoint:
A distinctive type of multipoint connection, composed of a central connection endpoint (central CE) and other, peripheral, CEs, and in which data originating from the central CE are received by all other CEs, and data originating from peripheral CEs are received only by the central CE. Peripheral CEs cannot communicate directly with each other.

Point-to-Point:
Communications between two designated stations only. Typically involves a dedicated line.

Portal:
A website that aggregates content and provides a methodology for accessing that content.

Privacy Policy:
The stated methodology used by a website for handling information collected on users of that website.

Public ports:
Publicly available data jacks where people can plug in their access devices to connect to the Internet. NOT the same as a POP.

Real Time:
Transmission or data processing mode in which the data is entered in an interactive (two-way communicating) session.

Redundancy:
Refers to a network that has a back-up system to ensure uninterrupted service in the event of failure of the main (primary) system. Usually a ring configuration, so that if one way out is blocked or impaired, there is an alternate route to carry the signal.

Remote Access:
Ability to send, receive and retrieve data to and from a computer through communications lines such as phone or cable lines. May also use wireless access.

RBOC:
Regional Bell Operating Company – one of the original seven (7) companies that managed the BOCs after the break-up of the old 'Ma Bell' network into local service providers and long distance service. The original seven RBOCs were – Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis (PacTel), Southwestern Bell and US West.

Satellite:
A microwave receiver, repeater or regenerator that is in orbit around the Earth. May be in a stable and fixed location or may be in a low earth orbit (called LEOS).

SONET:
Synchronous Optical NETwork - the American National Standards Institute standard for synchronous data transmission on fiber optic. The international equivalent of SONET is synchronous digital hierarchy (SDH). Together, they ensure standards so that digital networks can interconnect internationally and that existing conventional transmission systems can take advantage of optical media through tributary attachments. SONET provides standards for a number of line rates up to the maximum line rate of 9.953 gigabits per second (Gbps). Actual line rates approaching 20 gigabits per second are possible. SONET is considered to be the foundation for the physical layer of the broadband ISDN (BISDN). Asynchronous Transfer Mode (ATM) runs as a layer on top of SONET as well as on top of other technologies. SONET defines a base rate of 51.84 Mbps and a set of multiples of the base rate known as "Optical Carrier levels (OCx)."

Synchronous:
Data transmission mode at a fixed rate. This method eliminates the need for start and stop bits, because the receiver and transmitter work at the same rate. Requires more sophisticated digital equipment but is faster and some would say more reliable.

T-1:
Trunk Level 1 – a digital transmission using a dedicated connection that provides transmission capacity at up to 1.544 Mbps. This is the North American digital transmission standard. A T-1 line is capable of transmitting 24 voice conversations at the same time. Also known as DS-1 line.

T-2:
Trunk Level 2 – Operates at 6.312 Mbps and is equivalent to 4 times the capacity of a T-1 line. Typically used only by carrier networks, a T-2 line can transmit 96 voice conversations at one time. Also called a DS-2 line.

T-3:
Trunk Level 3 – digital transmission speed of 44.736 Mbps (same as 28 T-1s) and can carry 672 voice conversations at once. Also referred to as a DS-3 line.

Telecommunications:
Process of converting sound and data into electrical impulses that can be transmitted.

Telecommuting:
Using networked technologies to perform work-related activities away from the office or business using information and communication technologies.

Telephony:
The process of converting sound into electrical impulses for transmission over a connecting medium such as wires, fiber optics or microwave.

Terminals:
Access devices that enable the user to view web pages and transmit e-mail.

Transactional Websites:
Websites that enable the user to order and pay for goods and services online. Digitized goods and services can also be delivered online.

Trunk:
Line of communication between switching stations.

Twisted Pair:
Two copper wires twisted around each other. Twists may vary in length and reduce induction. This is the 'copper lines' referred to in POTS and the average local exchange service product.

Universal Service:
The federal program that establishes a 'surcharge' or fee on telephone service to create a fund which purpose is to reduce the cost of providing basic telephone service to every household in the nation. This has been the reason that business service is priced higher, even though the service delivered is the same.

VPN:
Virtual Private Network - A virtual private network (VPN) is a way to use a public telecommunication infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network. A virtual private network can be contrasted with an expensive system of owned or leased lines that can only be used by one

organization. The goal of a VPN is to provide the organization with the same capabilities, but at a much lower cost. May also be called point-to-point network.

Virus Software:
Programs that protect a computer or access device from being infected with software viruses that can destroy and/or alter data, applications, and systems.

WAN:
Wide Area Network – a computer and voice network with a geographic reach that may be larger than a city of single metropolitan area.

Wi-fi:
A local wireless application that operates in 2.4 GHz frequency band using low power (less than 100 mW) in a limited geographic range (less than 100 M). Data transmission rates can reach up to 11Mbps. This is a technology growing in popularity in high density/high traffic areas like airports. Also known as 802.11b technology with newer applications in the 802.11g category (IEEE standards).