

STATEWIDE ECONOMIC STUDY 2002



ARIZONA'S TELECOMMUNICATIONS INFRASTRUCTURE

July 2002

Prepared for the Arizona Department of Commerce

by

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INTRODUCTION

In its final report issued after more than a year of examining Arizona's readiness to compete in the "new economy," the Arizona Partnership for the New Economy (APNE) observed:

"So that all citizens of Arizona can take part actively in the new economy, the expansion of a telecommunications infrastructure to link everyone to the Internet and other communications tools is critical... (B)asic connections to the Internet and access to communications technology are the first step to benefiting from the new economy. APNE proposes supporting community-based efforts to assess and improve local telecommunications infrastructures and building upon existing initiatives to develop a statewide telecommunications strategy."¹

The report that follows presents a brief review of the state of telecommunications ("telecom") infrastructure in Arizona. As high-speed connectivity is particularly important to effective participation in the new economy, the report focuses primarily on broadband infrastructure, which is offered via many different technologies (e.g., fiber optic, satellite, microwave, digital subscriber line [DSL], cable, etc.).

As will be seen, Arizona's telecom infrastructure is a work in progress, characterized by much planning and building. The proprietary nature of, and highly competitive market for, most of this infrastructure makes discovering just what exists currently quite challenging; even more difficult is the effort to learn what infrastructure is planned for the future.

ANALYSIS OF CURRENT INFRASTRUCTURE

Prerequisite to the use of high-speed telecommunications, all of the following must be present:

1. A point-of-presence (POP) on a major long-haul network, which ultimately peers (in selected parts of the country) with other long-haul networks to form the Internet.
2. Access to the POP by local providers—either directly if the POP is in a central office (CO) or via a further connection (e.g., fiber optics) to a remote central office or hub.
3. Direct connections (telephone lines, television cable, wireless links, etc.) between the central offices or hubs and individual customers, bridging the "last mile" to bring broadband service to those customers.
4. A service provider that will offer broadband services to customers connected by that "last mile."
5. Willingness and ability of customers to buy the broadband service, which implies that the service must offer attractive value at a reasonable price.

¹ *An Economy that Works for Everyone*. Final Report of the Arizona Partnership for the New Economy, January 2001. <http://www.azcommerce.com/pdf/apne/FinalReport2001.PDF>

Arizona's current telecom infrastructure is addressed below, beginning with fiber-optic long-haul networks serving the state, followed by discussion of broadband services available in the state's cities, towns and rural communities. This information was obtained from a variety of sources since there is not yet a single clearinghouse for Arizona telecom infrastructure information - although Arizona's Government Information Technology Agency (GITA) is working toward that objective. Since this kind of information is only divulged by private telecom companies very reluctantly (if at all), the reader should bear in mind that new information may later come to light to update what is presented here.

FIBER-OPTIC LONG-HAUL NETWORKS IN ARIZONA

As of mid-2000, thirteen separate firms had fiber-optic long-haul networks, either in place or planned, bringing high-speed connectivity to or through Arizona. Nearly all of these networks pass through Phoenix, and most of them also pass through Tucson. The cities to which these networks connect outside of Arizona are Las Vegas, Albuquerque, Las Cruces, Dallas, San Diego, Los Angeles, San Bernardino, Riverside, Palm Springs, Blythe, and Nogales, Mexico.

Figure 1 below indicates which firms had fiber-optic long-haul cable passing through various Arizona cities as of mid-2000. Connections in the cities noted provide access to the indicated carriers' networks; these carriers, in turn, may interconnect with other regional, national or global carriers. It is important to note that the existence of a long-haul fiber-optic cable passing through a given community does not necessarily mean the community is connected to that cable. The Tier 1 Internet providers identified below almost all have POPs in Phoenix, meaning that they could provide local access to selected users in that area; some of these providers also have a POP in Tucson. It should be noted that, since these data were compiled, some of the listed firms have encountered precarious financial circumstances, including even bankruptcy proceedings in some cases. Thus, their ability to deliver the services indicated should be examined on a case-by-case basis.

FIGURE 1

ARIZONA FIBER-OPTIC LONG-HAUL CABLE PROVIDERS (As of mid-2000)							
Firm	Phoenix	Tucson	Flagstaff	Yuma	Kingman	Nogales	Mayer
AT&T	X	X	X	X	X	X	X
Broadwing (IXC Comm)	X	X					
Electric Lightwave	X	X		X			
Enron	P	P					
Frontier	X	X					
GST Telecom	X	X			X		
Level 3	P						
MCI WorldCom	X	X			X		
NTS Communications	X	X					
PF.net	P	P					
Qwest	X	X		X			
Sprint	X	X					X
Telmex						X	
Touch America	X						
Williams	X	X					
Worldwide Fiber	X	X					

X = in place P = planned

ACCESS TO BROADBAND SERVICE THROUGHOUT THE STATE

The data in Figure 1 demonstrate clearly that the Phoenix area is served by POPs of several fiber-optic network providers. The ability to tap into significant bandwidth has given rise to at least a half-dozen carrier hotels and co-location facilities in Phoenix that can be shared by numerous client firms. One of these facilities, the 300,000 square-foot Downtown Phoenix Technology Exchange, is reportedly served by more optic fiber than all but two other buildings in the entire nation.² (It is important to note that, although a POP may be present in a given community, local access to broadband service is not available unless individual customers are connected through a service provider to the POP.)

The rest of the state is less well served, although Tucson does have access to multiple providers. GITA has compiled a listing of cities served by broadband carriers including AT&T, Qwest, and Citizens Telecom.³ This listing shows that, of 209 Arizona cities, towns and communities, broadband service was available to an undetermined number of selected customers in 186 (89%) of them as of September 1, 2001.

As of April 2002, the Nielsen/NetRatings Internet audience research service reports that approximately 320,000 Internet users in the Phoenix metropolitan area access the Net via broadband connections (including cable modem, DSL, Integrated Services Digital Network [ISDN], and Local Area Networks [LAN]).⁴

The Pinkham Group has conducted a study of broadband DSL infrastructure throughout the nation.⁵ The portion of their report covering Arizona (see attached Exhibit 1) indicates that, as of the third quarter of 2001:

- Sixty COs, or 26.7% of all COs serving the state, were equipped to provide DSL service.
- All 31 of the COs that serve more than 20,000 households provide DSL service. Eighty percent of COs serving from 10,000 to 20,000 households could provide DSL service, while the figure drops to 54% of COs serving 5,000 to 10,000 households. Only four (2.6%) of the 154 COs serving fewer than 5,000 households in Arizona offer DSL service.
- Only 53% of households were close enough (within 18,000 feet) to the CO to qualify for potential DSL service. (Note that, even within the 18,000-ft. limit, perhaps 10 to 20% of those households face line impairments or other engineering problems that would make DSL service impractical.)
- 82.3% (approximately 1.52 million) of Arizona households had telephone service from telephone central offices (COs) equipped to provide DSL service.
- US West (now Qwest) was the local exchange carrier providing “last mile” connectivity to 91.7% of the households served by COs providing DSL service.

Clearly, potential access to broadband service is concentrated in Arizona's more densely populated locations at this stage of development of broadband infrastructure. Such coverage makes good business sense, given the high costs of establishing broadband capability and the need to recoup that investment as quickly as possible.

² E-mail from Brad Tritle, Telecommunications Manager, Arizona Government Information Technology Agency, 28 March 2002.

³ <http://gita.state.az.us/telecom/topaz/Carrier%20Services%20Territory%20Coverage.pdf>

⁴ http://www.nielsen-netratings.com/pr/pr_020520.pdf

⁵ http://www.pinkhamgroup.com/Samples/ST_DSL.pdf

The Arizona Cable Telecommunications Association estimates that approximately 1.8 million Arizona households currently subscribe to cable television, and about 50% of those are in locations where cable-modem broadband service could be provided. According to the 2002 *Television & Cable Factbook*, there are 91 cable TV systems in Arizona passing a total of 2,329,245 homes.⁶

High-speed Internet access via satellite connections are probably much less common than via DSL or cable (that is the pattern nationally), but no hard data on satellite coverage was found.

Efforts are underway to extend the reach of cable and/or DSL broadband infrastructure to rural parts of Arizona. In southeastern Arizona, Valley Telecom is building a fiber-optic link that will bring DSL service to several towns in that region by late 2002 or early 2003. This infrastructure will also be able to handle video-over-ADSL service, bringing customers TV programming via copper wires. Citizens Communications is planning expansion of DSL service to communities in the White Mountains of Navajo and Apache Counties.

Other technologies are also being considered for bringing broadband connectivity to rural communities. Several telecom providers operate microwave relay networks that could be used to provide moderate levels of bandwidth to remote areas for less than the cost of burying fiber-optic cables. However, tower locations within line-of-sight range of other microwave towers are required for microwave links. Tower owners are in discussion with GITA to pursue a geocoding/mapping project to identify the locations of usable towers around the state. Such a project would make it easier to identify the most efficient routes by which to bring service to under-served areas.

Government-led Demand Aggregation

Graham County presents a good model of demand-aggregation led by the public sector to bring broadband access to a rural area. This county had a noticeable need for expanded telecommunications infrastructure for several years. Private businesses (including Internet Service Providers [ISPs]) and government and educational institutions often waited more than two years for T1 lines that ultimately were undeliverable, due to a lack of "backhaul" infrastructure between Safford and Phoenix. The county government took the matter into its own hands by aggregating the demand of local institutions and using this demand to entice a wireless provider (Winstar) to install a microwave DS3 circuit between Safford and Phoenix. This circuit has been up for a number of years, and demand is now increasing for more circuits.

Community-based Telecommunications Initiatives

In several cases, individual communities or groups of communities have found it productive to organize their own initiatives to promote development of broadband telecommunications infrastructure in their areas. Motivation for such efforts often includes economic development goals as well as improved communications for educational, government, and non-profit organizations and for residents of the area. Some notable examples include:

- The communities of Prescott, Prescott Valley, and Chino Valley have conducted surveys to quantify interest and need for broadband services by residents and organizations. The TelCom Task Force brings those cities together with the communities of Mayer and Big Bug Creek in an effort to plan the development of broadband capabilities.
- The Goodyear Telecommunications Working Group brought together a number of concerned government agencies, businesses, residents, and especially home office owners to discuss the need for broadband service. The incumbent local exchange carrier (ILEC) had not yet installed DSL nor had the cable company installed cable modem service. The City of Goodyear used this

⁶ *Television & Cable Factbook*, Services Volume No. 70, 2002. Warren Communications News, Inc.

visible taskforce to engage existing and new providers in discussions about providing broadband services. Broadband services (DSL and cable modem) have subsequently been rolled out to the residential community, but there is still a need for broadband access for private and public organizations. The City of Goodyear has released a request for information (RFI) to identify possible strategies for reaching this goal.

- The City of Sierra Vista established a broad-based Information Technology Task Force to address the use of telecommunications and technology to enhance economic and community development and the quality of life in the area. The city has also hired a consultant to assess the level of information technology availability in Sierra Vista and to help develop a vision for the community in the “new economy.”

Several other examples could be added to this list. It appears that many of Arizona's communities, both urban and rural, are working to assess needs and opportunities and to facilitate access to broadband services.

ARIZONA BROADBAND ACCESS VS. OTHER STATES

A study commissioned by the CANAMEX Corridor Coalition examined broadband telecom infrastructure in the five states comprising the U.S. portion of the corridor (Arizona, Nevada, Utah, Idaho, and Montana).⁷ The study found that the major metropolitan areas within the corridor — especially Phoenix, Las Vegas, and Salt Lake City — generally had well-developed access to high-speed fiber backbone transport, cellular service coverage, and DSL access to subscribers. With respect to DSL service from the three largest local exchange carriers, the study reported that approximately 80% of subscriber lines had the option of DSL service in Arizona, Utah and Nevada, compared to 59% in Idaho and 30% in Montana. This finding probably reflects the lower degree of urbanization in the latter two states.

Reliable information about “last-mile” broadband access in rural areas was not reported in detail, partly due to inconsistent availability of reliable information. However, the study concluded that rural DSL access is generally deficient throughout the region.

Comparisons of Arizona's telecom infrastructure to additional states is difficult due to the challenges of obtaining reliable data on deployment and penetration of broadband services in local areas. Some commercial sources (e.g., the Pinkham Group referenced previously) do publish state-level summaries, but obtaining such proprietary data was beyond the scope of the present study.

BASIC TELECOMMUNICATIONS ACCESS IN ARIZONA

Firms that don't require high-speed connectivity to the Internet do, nonetheless, normally require at least basic telephone service to conduct their business. A study by the National Telecommunications & Information Administration (NTIA) reports that, in 1998, Arizona ranked 36th in the nation in percentage of households with telephones, with 92.9% of the state's households having telephones (the national average was 94.1%).⁸ More recently, the 2000 Census reported that 3.7% of Arizona households do not have telephone service, compared to 2.4% nationally.⁹

The 1998 NTIA report noted that telephone penetration nationally was lower among poor, non-white and less-educated households. Among the group including Native Americans, Eskimos and Aleuts, penetration was only 72.3%. As shown in Figure 2, telephone penetration within Arizona is significantly lower in

⁷ http://www.canamex.org/Existing_Infrastructure.pdf

⁸ *Falling through the Net: Defining the Digital Divide*. National Telecommunications & Information Administration, 1999. <http://www.ntia.doc.gov/ntiahome/fttn99/index.html>

⁹ <http://censtats.census.gov/data/AZ/04004.pdf>

the state's more rural areas, including much of Arizona's Indian reservation lands. Telephone service data for Arizona cities, towns, reservations, and Census-designated places are available on the Internet.¹⁰

Five of the seven tribally-owned telecommunications companies in the United States are located in Arizona. In each of these cases, the tribal governments responded to their citizens' unmet needs for basic telephone service. Some residents on Arizona reservations had been quoted prices as high as \$70,000 for the installation of simple local telephone service by their ILECs. Taking the matters into their own hands, tribally-owned enterprises were established, and the existing telecommunications switching and outside plant infrastructure was purchased from the ILEC (US West at the time). In at least four cases, the tribal governments accessed United States Department of Agriculture (USDA) Rural Utilities Service (RUS) funding to purchase the infrastructure.

Tribally-owned telecommunications enterprises in Arizona include Gila River Telecommunications, Inc., Fort Mojave Telecommunications, Inc., Saddleback Communications (Salt River Pima-Maricopa), San Carlos Apache Telecommunications, Inc., and Tohono O'odham Utility Authority.

FIGURE 2

HOUSING UNITS WITHOUT TELEPHONE SERVICE		
County	Occupied Units	% Without Telephones
Apache County	19,971	46.1
Navajo County	30,043	25.4
Coconino County	40,448	11.6
La Paz County	8,362	10.1
Graham County	10,116	6.7
Santa Cruz County	11,809	6.3
Gila County	20,140	6.2
Pinal County	61,364	5.5
Yuma County	53,848	5.4
Greenlee County	3,117	4.7
Cochise County	43,893	4.6
Mohave County	62,809	3.8
Yavapai County	70,171	2.9
Pima County	332,350	2.7
Maricopa County	1,132,886	2.1

Source: Census Bureau Sample Demographic Profiles, DP-4.

The rapid spread of cellular telephone facilities throughout the state has helped make telephone service more accessible to the state's rural areas, especially along major highways. Although cell phones provide only limited capability in terms of use of Internet-based communications due to the very limited bandwidth offered by current cell phone technologies in the U.S., rural businesses can at least carry out simple online operations using cellular service.

One program aiming to bring telephone service to more of Arizona's reservation residents is the Vision-One program subsidized federally and being implemented in Arizona and New Mexico by CellularOne.¹¹ Through this program, tribal members residing on the Navajo, Hopi, and White Mountain Apache reservations will be able to buy 25 months of cellular service for only \$25, including a free cell phone and free calls to tribal agencies. Such programs should more quickly bring telephone service to areas not served by landlines, which are expensive to run to low-density population areas.

¹⁰ <http://censtats.census.gov/cgi-bin/pct/pctProfile.pl>

¹¹ <http://www.cellularoneaz.com/html/visionone.html>

EFFORTS TO FURTHER THE DEVELOPMENT OF ARIZONA'S TELECOM INFRASTRUCTURE

The State of Arizona has several programs and offices involved in assessing telecom infrastructure needs and capabilities in the state and working to further the development of that infrastructure. The following section briefly reviews some of the more notable examples.

GOVERNMENT INFORMATION TECHNOLOGY AGENCY¹²

GITA is Arizona's state office charged with developing, implementing and maintaining a coordinated statewide plan for information technology. Beyond GITA's involvement with the state's own IT infrastructure, this entails working with both public and private sector organizations to identify telecom needs and potential solutions to address those needs.

To aid in the rapid deployment of broadband services, the state is aggregating government needs and soliciting more demand through community involvement in a program known as TOPAZ (Telecommunications Open Partnerships for Arizona). In June of 2001, GITA teamed up with the School Facilities Board to solicit proposals from telecommunication carriers to connect approximately 545 schools and 100 government offices in 135 rural Arizona communities with broadband telecommunication services. Schools and government offices in rural communities now have a choice for broadband services at competitive pricing. To meet the needs for individuals in these communities, cable operators throughout Arizona have formed an alliance under the name of "First Mile Arizona" to further the reach of services to homes throughout the state.

GREATER ARIZONA DEVELOPMENT AUTHORITY (GADA)¹³

Assessment of broadband telecom needs throughout the state is a key step in planning for infrastructure improvements. A significant program has begun to assess such telecom needs in Arizona's rural communities. With initial funding from the Greater Arizona Development Authority (which provides low-interest loans for infrastructure projects in rural Arizona), this program has identified five rural areas of the state (Parker, Sierra Vista, several communities in the White Mountains, three cities in Graham County, and Coconino County) for initial assessment efforts.

These assessments will then be replicated in other areas until the telecom infrastructure needs for the entire state have been determined. As the results of these assessments become available, GITA plans to track and report connectivity at the community level via a website being developed for that purpose.

The City of Flagstaff, in alliance with Coconino County and several public agencies who are providing additional funding, is taking the lead in the assessment effort. This alliance is pursuing a 5-year project to assess demand for broadband services, identify current and planned infrastructure, investigate feasible infrastructure alternatives for each area of Coconino County, evaluate financing alternatives, and assess public policy needs related to broadband infrastructure. Generating substantive estimates of demand for broadband connectivity through these assessment efforts is a crucial first step in attracting providers to build the needed infrastructure.

ARIZONA TELECOMMUNICATIONS & INFORMATION COUNCIL (ATIC)¹⁴

The Arizona Telecommunications & Information Council is an economic development foundation organization. The ATIC mission is to promote effective public policies for the state and local communities that encourage investment and deployment of information technologies and telecommunication services to promote educational advancement, enhanced quality of life and economic prosperity.

¹² <http://gita.state.az.us/>

¹³ <http://www.azcommerce.com/gada.htm>

¹⁴ <http://www.researchedge.com/atic/>

ATIC brings together businesses, economic development organizations, libraries, consumer organizations, local and state government agencies, educational institutions, health care, the Arizona Corporation Commission, the Arizona legislature, and information technology and telecommunications companies to enhance the telecom capabilities of the state.

Among its accomplishments to date, ATIC has:

- Helped develop the Arizona State Public Information Network (ASPIN) that provides Internet connections to schools, governments and libraries across the state.
- Promoted the development of Economic Development Information Centers (EDICs) in 28 Arizona libraries.
- Collaborated on an information technology business user survey and a white paper on the Importance of Telecommunications and Information Services for Businesses in Arizona.
- Taken a lead role in the Governor's Commission to Study the Telecommunications and Information Industry in Arizona and the development of the Telecommunications Policy Office.

ATIC has also developed the Arizona Telecom Directory, an online portal for locating telecommunication service providers delivering services throughout Arizona. Residential and business users can search for the availability of a wide range of telecom services by location and link to profiles of individual telecom providers, their contact information, and related resources. An ATIC committee is currently working on developing a telecommunications strategic plan for Arizona. Such a plan should be helpful in identifying needs for improvements to the state's telecom infrastructure.

REFERENCES

An Economy that Works for Everyone. Final Report of the Arizona Partnership for the New Economy, January 2001. <http://www.azcommerce.com/pdf/apne/FinalReport2001.pdf>

Arizona Telecom Directory. Arizona Telecommunications & Information Council. <http://arizonatele.com>

"Biggest Broadband Cities Get Bigger, According to Nielsen/Netratings." Netratings, Inc., May 20, 2002. http://www.nielsen-netratings.com/pr/pr_020520.pdf

Broadband Market Survey - DSL Availability of Incumbent Telcos - Q4 2001. Arizona summary. Pinkham Group, http://www.pinkhamgroup.com/Samples/ST_DSL.pdf

CANAMEX Corridor Plan Working Paper: *Task 1: Existing Infrastructure*. Submitted by Economics Research Associates *et al.* to the CANAMEX Corridor Coalition, August 3, 2001. http://www.canamex.org/Existing_Infrastructure.pdf

Falling through the Net: Defining the Digital Divide. National Telecommunications & Information Administration, 1999. <http://www.ntia.doc.gov/ntiahome/fttn99/index.html>

Government Information Technology Agency listing of cities served by broadband carriers. <http://gita.state.az.us/telecom/topaz/Carrier%20Services%20Territory%20Coverage.pdf>

Profile of Selected Housing Characteristics: 2000. Table DP-4 (available online for all states, counties, cities & towns, and Census-designated places). <http://censtats.census.gov/cgi-bin/pct/pctProfile.pl>

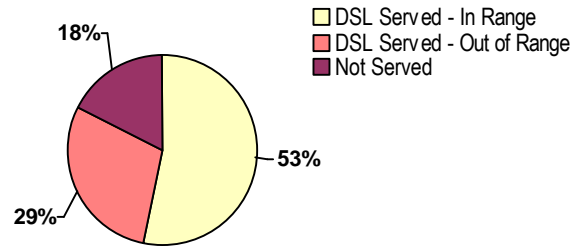
Television & Cable Factbook, Services Volume No. 70, 2002. Warren Communications News, Inc.

Arizona

Market Summary Data

	Market Total	Gross DSL Coverage*	
		Total	% of Total
Households	1,843.9K	1,516.8 K	82.3%
Population	4,628.5 K	3,718.3 K	80.3%
Central Offices	225	60	26.7%
Market density (Hhlds per CO)	8,195	25,280	

*Note: not adjusted to reflect the impact of distance, line impairments, or DLC coverage on actual service availability

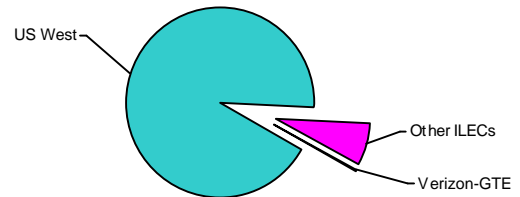


Households served by DSL deployed COs and within ADSL Range (18K ft circuit length)

Who Owns the "Last Mile" Infrastructure?

Household Coverage by Local Exchange Carrier (LEC)

LEC	COs	Hhld Coverage	
		Total (K)	% of MSA
US West	129	1,691.6	91.7%
Other ILECs	90	124.4	6.7%
Verizon-GTE	5	4.9	0.3%
Total	225	1843.9	100.0%



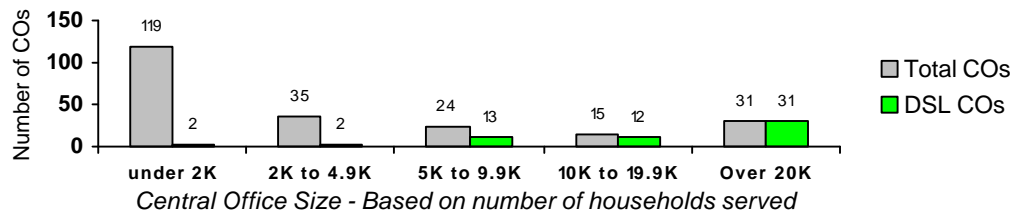
Total Households Served by LEC

DSL Deployment Detail - Profile of DSL coverage based on Central Office size

Central Office Deployment

The primary criteria in determining where DSL is deployed is household density. Deployment is sharply skewed towards COs serving at least 10,000 households, and is scant for COs serving less

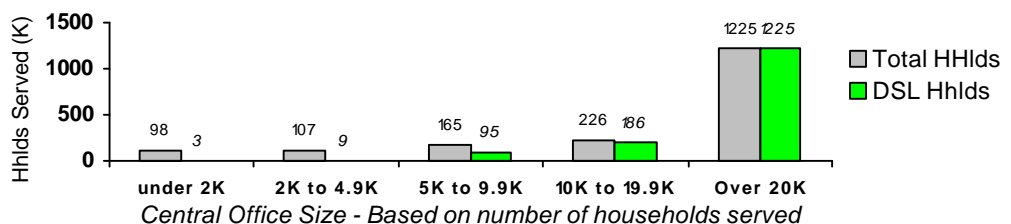
Comparison of the total number of CO verses DSL-deployed COs



Household Coverage

Households are heavily concentrated in urban areas. In focusing of the high density COs, DSL wholesalers are able to cover the majority of households.

Comparison of Total Households verses Households served by DSL-deployed COs



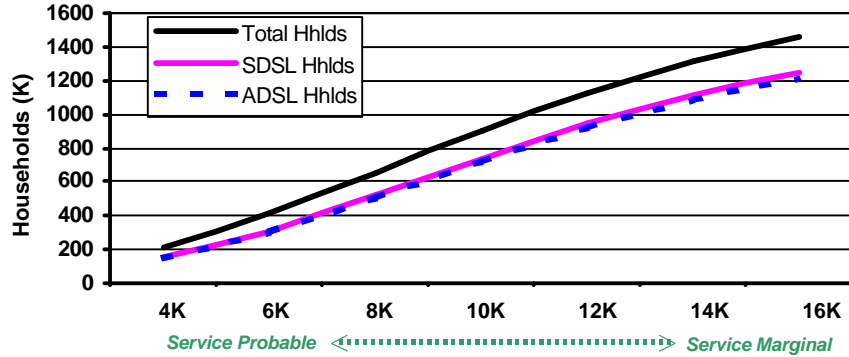
Note: DSL Hhlds is not adjusted to reflect the impact of distance, line impairments, or DLC coverage on actual service availability

Arizona

Current DSL Availability based on Distance to the Central Office

Availability is based on the approximate aerial distance of households to the serving CO. ADSL and SDSL deployments are tracked separately. This analysis does not incorporate the impact of DLCs, or other possible service impairments.

Households Reached by ADSL and SDSL Services vs Distance to CO



		Aerial Distance to CO (feet)						
		Number of CO's						
		4K	6K	8K	10K	12K	14K	16K
Total Hhlds (K)	223	218.0	415.8	650.0	896.4	1125.9	1314.2	1456.2
<i>% of Total</i>		12.0%	22.8%	35.7%	49.2%	61.8%	72.2%	80.0%
SDSL Hhlds (K)	55	150.1	313.3	517.3	737.2	945.5	1116.9	1245.5
<i>% of Total</i>		10.2%	21.3%	35.2%	50.2%	64.4%	76.1%	84.8%
ADSL Hhlds (K)	52	150.1	312.4	512.5	726.4	927.6	1091.7	1215.3
<i>% of Total</i>		10.6%	22.0%	36.1%	51.2%	65.3%	76.9%	85.6%