

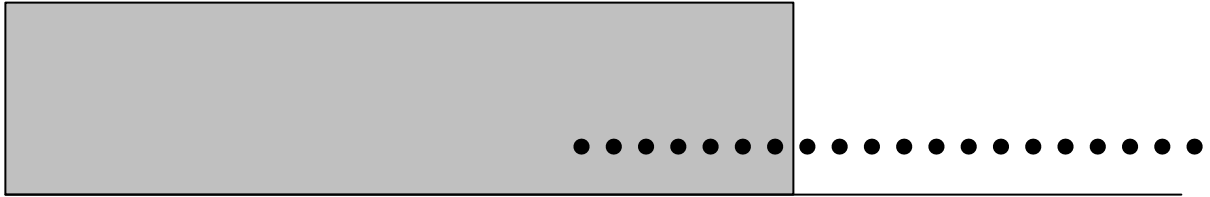


*Wired, Ready, and Waiting*



**Delaware County's Potential to Excel in the Networked World**





# *Wired, Ready, and Waiting*



*Delaware County's Potential to Excel in the Networked World*

DEPARTMENT OF URBAN PLANNING PROJECT TEAM  
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# Project Team

The Ball State University project team is comprised of fifteen fourth year undergraduate students under the direction of Dr. Eric Damian Kelly, FAICP professor of urban planning at Ball State University. Currently, the project team is focused on networked community issues, providing a tool for the city of Muncie, Indiana Chamber of Commerce.

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Foreword: Networks and 21st Century  
Communities

Networks will shape communications, work, lifestyles and communities in the new century. Communities that are networked today can lead others into the wonders of the networked world.

Telephones, once conceived as an emergency or business tool, rapidly spread to homes of every size, transforming lives and relationships and changing the effect of distance. Telephones brought a new dimension to communication, which, for most people and most purposes, had previously consisted largely of in-person visits or formal correspondence. Six decades after the telephone became a common household fixture, personal computers ushered in an era when many homes have more computing power than a major accounting firm had 25 years ago.

Today, networks combine and expand on the power of those tools, promising to transform the ways that we communicate, conduct business and carry on our lives. Cell phones that capture current stock quotations, refrigerators that create grocery lists as supplies dwindle, and smart houses and cars that adjust to the preferences of individual occupants are only hints of what will come. The networked era is an era in which network communications will be as common in homes as cable television—perhaps as common as the telephone—and in which businesses will depend increasingly on network connections for instant and virtual communications.

*Defining a Networked Community*

A networked community is a community that has:

- The physical infrastructure to provide "always-on" network connections to almost everyone almost all the time;



- A virtual, or on-line, community presence that expands upon but that supports and reinforces the existing physical community;
- Leadership users of networking, pioneers who help define the future networked world and then help to lead others to it;
- Many committed users of the network in business, education, government, health care and community life in general.
- More specifically, a networked community has, or shortly will have, characteristics that include these:
  - Fiber-optic cable in every part of the community, offering access to high speed network services;
  - Multiple providers of broadband service, possibly including a local telephone company, cable television provider, and independent broadband providers who generally provide the "last mile" of access from an individual residence, business or institution to the larger network;
  - One or more providers of wireless data services, making networked services available to mobile workers;
  - Most or all businesses have always-on connections to the network;
  - Government provides extensive services over the network, with most or all employees always connected to the network;
  - Students, teachers and administrators in the K-12 schools all have always-on access to the network and students, parents and teachers use the network to reinforce other communications;
  - Colleges and universities are fully networked, offering administrative and support services as well as educational content through the network;
  - Health care institutions use the network to communicate with and monitor patients, to communicate with and support providers and to provide community education;
  - Non-governmental organizations exist on the network as well as in the community, using the network for communication, education and support;
  - Economic development starts with the network, ranging from on-line business incubator services to full access to high-speed communications for everything from ware houses to research centers;
  - Workers are educated to benefit from and use the network;

- High-speed network access points are as available as pay phones are today;
- Consumers can find local goods and services through the network;
- The network and its users have in place privacy, security and appropriate use policies;
- Public laws and policies protect network access and communications.

### *Significance of Networking to Community*

What are the advantages to living or working in a networked community? Think of the first communities that had widely-available telephone service; and the first communities that had radio stations; and the first communities served by the railroad, or, later, by the Interstate highway. Then think of being one of the first communities to get telephone service, a radio station and an Interstate highway—all at once. The first networked communities will be in roughly that position:

- Like the telephone, the network offers unprecedented speed, convenience and sophistication in two-way communications;
- Like commercial radio, the network offers unprecedented power and speed to disseminate local information to an entire community;
- Like the Interstate highway system (or the railroads before it), the network offers the most modern and rapid commercial connections to the rest of the nation and the world.

Some day, most communities will have at least the physical infrastructure of a networked community. Today a small number already have that physical infrastructure and a small percentage of those—led by communities like Blacksburg, Virginia, and Tacoma, Washington—have the applications, leadership and virtual community infrastructure to make them truly networked communities. Those networked communities are likely to play a defining role in the evolution of the economy and sociology of the twenty-first century, just as port cities like New York, Philadelphia, and Boston, led the early development of the nation and railroad cities like Chicago, Pittsburgh, and Kansas City shaped much of the industrial revolution.



## *Benchmarking: Muncie as a Networked Community*

The report that follows examines the assets and opportunities of one community—Muncie and Delaware County, Indiana—as a potential leader among these networked communities. The measures used in this report are those established by the Computer Science Policy Project, a consortium of providers of technology (<http://www.cspp.org>). Although there is obvious self-interest among these technology interests in encouraging the use of their products, the analytical framework provided by CSPP appears to be a rational one reasonably related to the demands of the networked world. More important, it establishes benchmarks being used by other communities to measure themselves—thus offering the opportunity for Muncie to measure itself against its competitors—and to improve its position on a scale designed to measure community competitiveness in the 21st century.

Dr. Eric Damian Kelly, FAICP



# Introduction



## *Statement of the Situation*

As the 21st century opens, the Internet is becoming an indispensable part of everyday life. Worldwide communications allows information to pervade nearly every home and workplace. News is now made available with the speed that once was only possible by television or radio, but as in-depth as a newspaper.

Due to technology of the Internet, mobile telephones, personal digital assistants (PDAs), e-mail, E-commerce, and company and government Intranets, our world is dramatically changing. These facts are transforming the nature of economies, societies, government and interpersonal relations. Companies that do not embrace these technologies are considered as archaic, and communities must develop technological resources to maintain a national, and a global, status. While larger cities will enable technology earlier than smaller ones, it is imperative that the smaller cities also work to become networked communities.

## *The necessity of this report*

The goal in this report is to ensure that the opportunity to gain access to technological tools and skills needed are available. This report examines the development of high technology in the present community and suggests future directions.

The data in this report has been compiled by Ball State University's fourth-year Urban Planning project team in an effort to provide Muncie and Delaware County, Indiana, with the basic tools needed to evaluate the existing technology and provide knowledge to make future decisions. Production of this report for the Muncie Chamber of Commerce and other interested groups will stimulate thought and consideration on Muncie's current situation and desires for growth. Ideally, this report will be used as a tool in the creation of a plan that directs future changes to make Muncie and Delaware County a more networked community.



## *The form of the report*

In order to measure how well a community fulfills the definition of a networked community, the Computer Systems Policy Project (CSPP) has developed a methodology followed in production of this report. The core of the method includes five categories that are evaluated to the extent they are provided in the community. This method creates a simple readiness assessment that can be used to illustrate strengths and shortcomings in the present community and direct future improvements and growth.

These five key categories are essential to the development of an analysis of the benefits that the networked community offers:

### *Infrastructure*

The Network Infrastructure examines the availability, speed, quality, accessibility, and type of network connections that comprise a networked community. This category includes a study of Internet service providers' (ISPs) coverage and the capacity at which they are able to meet service demand with reliable, affordable, and competitive services within the community.

### *Access*

The Network Accessibility explores the community's ability to connect to the network infrastructure. This category encompasses all networked environments including community businesses, educational institutions, government agencies, healthcare service providers as well as the residential sector of the community.

### *Application*

The Network Applications and Services considers the relationship between the networked world and the existing community. This relationship involves the integration of both public and private sector organizations and the manner in which their services aid in the expansion of community interaction, opportunities, and resources.



## *Economy*

The Network Economy illustrates the important role that the network has in shaping the changing market. This component of the network stresses the ability to promote innovative and efficient business practices, to educate the workforce to adapt to changing job market conditions, and the extent to which the network will impact consumer behavior.

## *Networked World Enablers*

The Networked World Enablers are the primary contributors in the expansion and distribution of networked services. These enablers include ubiquity of access to network services, security and privacy of transactions within the network, and the identification of network issues that leads to sound policy-making decisions.

## *Methodology*

Various methods were used to obtain the information used in this report. The Internet is a driving force in the world today and the focus of this report; therefore the Internet was consulted many times throughout the research. Many Web sites containing relevant information were consulted as well as those Web sites that provide information to the public about the city of Muncie. This was an important step in the research process as well as determining Muncie's status as a technology-driven community.

Students attended a variety of meetings that were held throughout the duration of the writing of this report. These meetings ranged from healthcare and education to local utility service providers. While providing valuable information in regards to Muncie's status and potential as a networked community, these meetings also addressed the range of professions and their application of technology and their future within the networked community. Phone and e-mail interviews were conducted with many professionals who were not immediately accessible within the constraints of geography, transportation, and the ensuing deadline.

As a final step in the gathering of information for this report, a survey was designed. This survey was intended for businesses within Muncie and Delaware County. The survey addressed



Internet use in terms of access, infrastructure, intended use, workforce, and security. The survey was posted on the studio Web site dedicated to this project as well as e-mailed to members of the Chamber of Commerce.







This section of the report examines the availability, speed, quality, accessibility, and type of network services available in Muncie/Delaware County. The quality and cost of services depend on: the cables and other physical infrastructure that provide the backbone of the system within the community; the cables or other infrastructure that link the community to the global network; the broadband and other service providers who provide the interface between local users and the physical network; and the extent of competition among those providers.

## Factors Considered

### *Local Physical Infrastructure*

Local physical infrastructure typically includes:

- Telephone lines, owned by the local telephone company;
- Television cable, owned by one or more local cable television providers;
- Supplemental cable, installed by competing service providers who offer telephone or data services to large users, such as businesses;
- Towers and antennae that link wireless users to the network.

Most communities have telephone lines and television cables throughout the community. Not all cables are equal, however. The original telephone lines and coaxial television cables were made of copper. Beginning in the 1980s, some telephone and cable companies began to substitute fiber optic cable for some copper installations. Fiber optic cable carries digital signals using light rather than electric pulses. It offers increased speed, reliability, and capacity. The use of fiber optic cables between continents has largely eliminated the delays and echoes that used to characterize many international calls. That same speed and increase in capacity are useful and, in fact, essential for many types of data handling. Thus, the extent to which the



community has fiber optic cable becomes a significant determinant of its preparedness to be an effective networked community.

Most communities also have some form of cellular telephone service. Today, the service standard is digital wireless service, a type of service that can easily be adapted to handle data. The coverage of a community by multiple providers of basic digital wireless service is another important measure of its preparedness for the 21st century. Today, few communities (many of them in other countries) have wide-area wireless service that handles a full-range of Web-browsing capability, as well as the voice traffic and e-mails handled by basic wireless service providers. Although such service is not widely available in the United States outside individual buildings (such as airports or major university buildings), some businesses and other users will expect to find such service available to them in modern communities of the future.

## *Interconnecting Physical Infrastructure*

Early telephone connections among communities consisted of extensions of the same copper wire used to handle voice traffic within communities. During the last quarter of the 20th century, telephone companies and other service providers shifted much of that inter-city and interstate traffic to other forms of transmission: point-to-point microwave relays, then linked back into the local networks; satellite relays; and fiber-optic cable. As with local service, fiber-optic cable currently provides the benchmark for the optimal combination of quality, speed, and capacity. A network is like any other chain—it is only as strong as its weakest link. Thus, a community with a high-speed local network that is linked to the larger world only by heavily used copper wires will not have an optimal level of service. Fiber-optic connections to the global network are essential today for high-volume and high-tech users of the global network.

### *Local Service Providers*

Many communities have only two local communications service providers—the local phone company and the local cable company. In some small communities, those may be the same company. Recent experience suggests that network technology is made available to more





obtaining and combining A.C. power simultaneously with RF on coaxial cable line (which cable television and telephone lines use) in order to provide a broadband connection. This type of service allows for Internet and television use to occur simultaneously due to the variances in frequencies. In addition, this service is “always on,” meaning that the Internet access is available as soon as the computer is turned on. Cable modem’s maximum speed is (a theoretical possible of) 3.5Mbps, realistically about 1-1.5Mbps—which is still 27 times the speed of a 56 kbps dial-up service.

Businesses and large institutions may connect to the Internet through “T-1” lines or frame-relays, dedicated, high-speed connections that can link multiple users at a single location to the global network. T1 and T3 lines are dedicated connections that are capable of speeds of 1.5Mbps (T1 line) and 45Mbps(T3 line). The reliability of these connections is also significantly higher than other connections, due to the nature of access and direct connection to the user. There is a substantial initial fixed cost for the necessary equipment and fiber optic cable, and monthly costs are based upon multiple factors—dependant on the individual customer. The typical cost for a T1 line is approximately \$1,000 a month while T3 line costs are considerably higher.

An alternative form of connection is a DSL (Digital Subscriber Line), which uses copper lines over a short distance to link back to a central service point that provides high-speed links to the rest of the system. DSL service is typically provided over dedicated telephone lines. Digital Subscriber Lines use existing POTS (Plain Old Telephone Service) lines to transmit data signals along with analog signals (such as voice, fax, and dial-up modem) via different frequencies. DSL is a “point-to-point” service, meaning that the number of other users does not affect the individual user’s bandwidth. In addition, DSL operates at a much higher speed (from 256kbps up to a theoretically-possible 8Mbps) than dial-up and ISDN services, and like cable modem service, is “always on.” DSL service is offered in some communities by the local telephone company, but there are an increasing number of competing providers of DSL and other so-called “broad-band” high-speed service. Each provider must have a node or point of connection for its DSL service at a central location in the community; reliable DSL can be provided at distances up to 12,000 feet away from that central location.



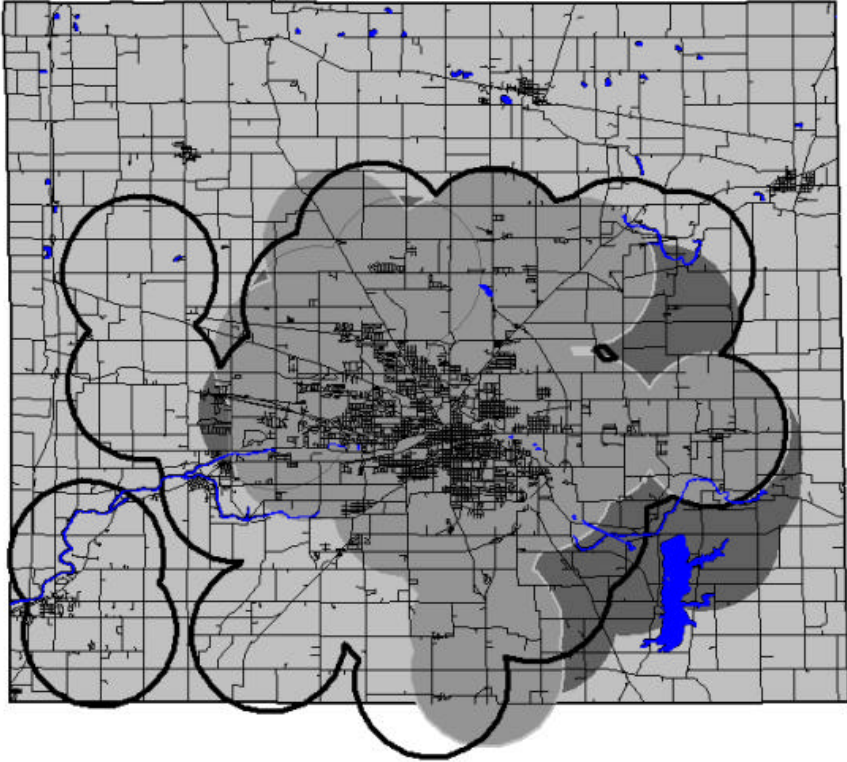


speeds are limited by the dial-up connection to 56kbps. Two-way satellite technology that uploads via 128kbps satellite signals has just recently come on the market.

*Infrastructure in Muncie—Applying the Factors*

The City of Muncie currently exhibits tremendous potential in the capabilities and coverage levels available in its network infrastructure. Comcast and Ameritech are the primary network infrastructure owners within the city of Muncie and its surrounding area. Other network backbone providers include (but are not limited to) McLeod USA and AT&T.

The current range of Internet services available within the Muncie-Delaware County area are: dial-up, ISDN, T1 and T3, Cable Modem, DSL, and wireless Internet connection.



**Broadband Internet Service Coverage Area**

Delaware County    DSL Available    Streets    Future DSL Service    Cable Available



## *Local Physical Infrastructure*

Ameritech and Century Communications (which preceded Comcast as the local cable television operator) have invested substantial sums in laying fiber optic cable throughout the community. Both companies have fiber-optic cable in every part of the city and in some surrounding areas. Comcast has more extensive service to the west of Muncie and on the East side, while Ameritech has extended fiber to the new industrial park at I-69 and S.R. 332. As the following maps show, most residents of the area and almost all significant business locations are located near existing fiber-optic cable. That infrastructure makes cable modems, DSL and other broadband services widely available in the community.

Like most communities of this size, Muncie and the surrounding area are thoroughly covered by communication towers of wireless service providers, with Sprint PCS and Verizon appearing to dominate the local market. Although text message, e-mail retrieval and stock quotations are available through these existing wireless service providers, other wireless Internet services are not available—although there will be on-premises wireless access in several buildings at Ball State University by the end of 2001.

## *Infrastructure Connections*

There is at least one “dark fiber” cable running through downtown Muncie, on its way from Indianapolis to Fort Wayne and points beyond. At least two companies are currently exploring the possibility of offering high-speed links to this large backbone. It is reasonable to anticipate that such service will become available in 2001.

## *Service Providers*

### *Dial-up*

A dial-up connection uses a phone line to connect to an ISP’s (Internet Service Provider’s) server, and can either be the user’s normal voice phone line or a second phone line specifically reserved for Internet (modem) use. Current dial-up speeds are limited to 56kps (kilobits per

second). This type of connection is the most prevalent among residential users primarily because of its low cost and the fact that it is readily available.

Dial-up service is available anywhere that there is a telephone line, which includes all parts of Delaware County. There are numerous providers available in the city and county, many of whom are large national companies such as AOL and Earthlink. In addition, there are several ISPs that serve the Central Indiana region—including Delaware County. These ISPs include Iquest, IndyNet, Cybermania, Ameritech and Internet Exchange. The price of dial-up service per month ranges from free (advertising-supported) to \$29.95, depending on the company and number of features.

The demand of dial-up Internet service depends on several factors--the quality of Internet service provided, speed preferences, and special features all affect the demand of this type of connection, as well as the others listed below. The reliability of dial-up service is significantly related to the number of users within a region who are using the network infrastructure at any given time as well as the applications run by the users.

The majority of Internet users, both residential and commercial, in the Muncie community access the Internet through dial-up connections. The results of the Ball State 401 Planning Studio and the Chamber of Commerce business survey indicated that 53 percent of all respondents to the survey directed primarily to businesses and institution use a dial-up provider to access the Internet.

**ISDN**

ISDN, another type of dial-up connection, involves a method of connection in which two of the wires in telephone cable act like individual phone cables, so ISDN's speed can be twice as fast as a dial-up, or 128kbps. This type of connection also requires a second phone line specifically reserved for Internet (modem) use.

ISDN service is available within the city of Muncie and some of its peripheral area. The two primary providers of ISDN services are Ameritech and McLeod USA. The services offered start



at approximately \$50 per month, depending on the number of features desired with the Internet Service Provider's package.

Demand for ISDN is limited to the city of Muncie and its peripheral area due to its limited capability of delivery at increased distances. The results of the business survey indicated that approximately 11 percent of the business respondents currently use ISDN connections.

*T1 & T3*

Currently, the only T1 and T3 providers in Muncie are Ameritech and McLeod USA. Additional lines are available upon request, so any company can potentially be serviced in the Muncie community and the rest of Delaware County.

Demand for T1 and T3 lines is often limited to large commercial users or government entities. In the business survey, twenty-seven respondents to the business survey indicated that they use T1 or T3 lines.

*Cable modem*

Comcast, one of the major network providers, delivers cable modem access to the Muncie community. Currently, Comcast offers the @home Internet service to residential users and (possibly) small home-based businesses at a cost of approximately \$45 per month; additional Internet service options are available for additional fees. Insight Communications provides Albany and Eaton with cable television service, but does not currently offer Internet access.

Although Comcast does not currently offer cable modem access to local businesses, the company is currently working towards providing Comcast Commercial Online within the near future.

*DSL*

DSL service is currently available within the city of Muncie and some of the surrounding area. These services are available to both residential and commercial users at varying costs—

depending on the level of bandwidth and features desired, and the demands of the specific users.

The commercial/business providers of DSL in the Muncie community include (but are not necessarily limited to): DSL.Net, New Edge Networks, and Megapath, and the residential providers include: DSL.Net, New Edge Networks, and Telocity. The cost of commercial DSL services start at \$139 per month, while the residential DSL services are available upon request for as low as \$50 per month.

*Wireless & Satellite Services*

*Mobile and Fixed Wireless*

Wireless technology allows Internet users to connect standard telephones, fax machines and computers to wireless networks through radio signals rather than through end-to-end wire communication—which provides quick access to high quality, reliable and cost-effective telephone and Internet service.

Digital wireless service is available for much of Delaware County. The local providers of these services include (but are not limited to): Nextel, Verizon, and Sprint PCS. These providers offer such services as: text messaging, e-mail, and mobile Internet services for an additional \$6.95-\$9.95 for their customers’ current wireless packages. The standard delivery speed of these (mobile) wireless services is approximately 12.2-14.4kbps. These speeds are projected to increase substantially in the near future as wireless providers expand and upgrade their technology.

Fixed wireless technology uses cellular towers that transmit microwave frequencies to and from the receiving sites. This allows for a greater amount of data to be sent in a signal at higher speeds, but, like cable modems, speed varies according to the number of users connected at any given time.



### Satellite

DirecPC, Intellicom, and Starband offer satellite Internet service to most of the Continental U.S. This would include Delaware County. Various degrees of service are available, based on number of connections or by time limits. DirecPC, for an example, offers residential prices that begin at \$20 per month, while their larger business service begins at \$130 a month.

### Comparison of Available Internet Services in Muncie

Type	Dial-up	ISDN	Cable	DSL	T1 and T3	Mobile Wireless	Satellite
Typical Speed	Up to 56kbps	56kbps or 128kbps	About 1.5Mbps	144kbps-8Mbps (multi-line)	1.5Mbps (T1) 45Mbps (T3)	12.2-14.4kbps	400kbps (download)
Business	OneMain, Iquest, other national ISPs	Ameritech, McLeod USA	Not Yet Available	DSL.net, New Edge Networks, Megapath	Ameritech, McLeod USA	Nextel, Verizon, and Sprint PCS	DirecPC, Starband, Intellicom
Residential	Same as above	Same as above	@home	DSL.net, New Edge Networks, Telocity	Not suggested	Same as above	DirectPC, Starband
Initial Cost	Low	Moderate	Moderate	Moderate	High	Moderate	Moderate
Monthly Cost	Free to \$30	\$50 to \$75	\$50	\$50 to \$800	Varies	\$7 to \$10 in addition to phone	\$30+

### Competition

As the discussion above suggests, there is competition in Muncie. Century introduced competition to the local market in 1998 when it introduced cable modems and the @home service. Although DSL service was apparently not available in Muncie in most of 2000, it appears that there will be at least 4 active providers of DSL and related broad-band services in the community in 2001 – McLeod Communications (equipment installed, office open); DSL.Net (taking orders, quoting 6-week installation); New Edge Networks (equipment installed; estimating availability in the 2nd Quarter of 2001); and Telocity (taking orders now). Ameritech continues to express the intent to offer such service at some undetermined time in the future.



## *Conclusion*

Muncie is a physically networked community. The availability of extensive local physical infrastructure in all parts of the community, the imminence of direct connections to the “big pipe” to the rest of the world, and the activity of multiple competing service providers all offer the community great opportunity for social, economic and community development in the 21st century. The rest of this report examines how well that opportunity is used today.





This section of the report reflects the measurement of Internet access across five sectors of the economy—households, education, government, business, and healthcare. The term access, as applied here, refers to the availability and use of the Internet. The ultimate goal of this research is to determine Muncie/Delaware County’s current standing in its journey to a networked community. To that end, this report will highlight sectors that are in need of network access development. Access development is vital to ensure that all can participate in the networked community.

Factors Considered

Factors considered in determining the level of access for all locations and types of uses other than homes include the following:

- Percentage of employees with e-mail accounts;
- Percentage of employees with always-on connections;
- Percentage of “mobile employees” (presumably referring to outside salespersons and technical service personnel) with wireless Internet access.

For government and educational institutions, additional measures include:

- Availability of always-on connections in classrooms;
- Availability of always-on connections in public places;
- Availability of wireless networks in specific public places, such as campuses, airports and convention centers.

For homes, the measures of access include:

- Percentage of homes with a computer;
- Percentage of homes with actual connection to the Internet;



- Availability of always-on connections and access to the Internet from multiple locations within each home.

## *Home*

According to the National Telecommunication and Information Administration's report, *Falling Through the Net: Toward Digital Inclusion* (August 2000), 51 percent of national households owned a computer and 44.4 percent of total households use the Internet. Within the state of Indiana, 48.8 percent of the total households owned a computer and 39.4 percent use the Internet. These figures indicate (based on national figures) that in terms of home access, Indiana is within Stage 2. Indiana's household computer ownership and Internet usage is developing toward that of national standards.

Local household computer ownership and Internet usage statistics for Muncie/Delaware County specifically are not available. What is known is that there are at least eight different service providers open to Muncie and Delaware County residents, not including satellite or wireless connection options (see table titled "Comparison of Available Service in Muncie" located in the Infrastructure chapter of this report). Data as to the number of households each of these companies serve and amount of service each receives has not been attainable within the scope of this report.

## *Education*

Education for students in the 21st century now relies heavily on technology and the ability to access the Internet. Therefore, this section of the report addresses the Delaware County School Internet access. Simply stated, do the schools in Delaware County have access to the Internet; are they connected to a network; and how are these tools used to further educate students and get parents involved? Current educational and technological tools are overwhelming, and Delaware County must use this technology to enhance and facilitate better teaching.





Ball State University's Computing Services department diligently works toward the acquisition of the best technology available. UCS is working on a cooperative effort with an in-house employee, the college deans, department chairs, and faculty to address requests for Web-based instructional applications.

There are also plans for wireless technology on the campus—including wireless service centers in Bracken Library, in the new Food Court in the Art and Journalism Building and in selected academic portions of the journalism building. The use of this additional technology will allow students, faculty, and staff to access the same information from a wireless connection as with a desktop computer connected to the network. "Eventually wireless installations will expand to the entire campus giving campus network users the freedom to work from any location within most buildings and in several "green spaces" (University Computing Services: A View of the Future p.8)

*Government*

The CSPP readiness guide suggests four areas of network access development for government entities that are: (1) type of connection, (2) use of e-mail, (3) wireless access, and (4) public terminals. (A majority of the City of Muncie government departments report either a dial-up for Internet access, or do not use the Internet at all.) Since less than 50 percent of the departments use a dedicated connection, they are ranked below Stage 1 for connection type. Less than 25 percent of city employees are using e-mail for work related purposes. This figure places city employees below Stage 1 for e-mail usage. City of Muncie field employees do not use wireless devices to connect to the Internet and are, therefore, in Stage 1 for wireless access development. Less than 50 percent of city buildings have terminals with dedicated connections available to the public, placing the city in Stage 1 for public terminals. These results strongly suggest that the Muncie Government is underdeveloped for the Networked World.



Delaware County has a T1-line dedicated connection to the Internet. Since 100 percent of county departments have access to this dedicated connection, they are in Stage 2 for connection type. Close to 100 percent of the county employees use e-mail for work related purposes. However, with more than 25 percent of employees using e-mail, Delaware County is in Stage 1 for e-mail usage. With less than 50 percent of field employees using a wireless connection, the county is in Stage 1 for wireless access. Publicly accessible terminals are available in less than 50 percent of the county buildings, placing Delaware County in Stage 1 for public terminals. These results suggest that the Delaware County offices are underdeveloped, but working towards solutions for the Networked World. County offices are online and searching Web sites for information, and have not reached a point where intergovernmental networks are accessible to coordinate operations and used as a tool to allow representatives to communicate directly with their constituencies.

*Business*

In terms of local businesses, the survey results show that 38 percent of area businesses have dedicated connections to the Internet. This percentage places the business sector in Stage 2 for connection type. With less than 25 percent of area employees using e-mail for work related purposes, area businesses are below Stage 1 for e-mail usage. The survey results report that less than 50 percent of field employees use the Internet via wireless devices, placing the business sector at Stage 1 for wireless access. Collectively, these figures suggest that the Muncie/Delaware County business sector is underdeveloped for the Networked World. Additionally, the capabilities for employees to provide people both outside and inside the organization with information are weak.

*Healthcare*

In the health-care sector, Cardinal Health Systems is the largest healthcare provider in Delaware County and has a network that is one of the largest, connecting twenty remote sites to the system. The network, connected through a T1 line, provides always-on connections to every department within Ball Memorial Hospital and several other remote locations including



labs on the campus of Ball State University. These figures place healthcare in Stage 3 for network connection access.

Within Ball Memorial Hospital, e-mail interaction between employees and clients is available. Twenty-eight percent of BMH employees currently have an e-mail account provided by the hospital. All e-mail accounts are provided on a need basis. Judged solely on percentage, healthcare remains in Stage 2 in terms of e-mail.

In terms of wireless connections, Cardinal Health Systems is currently working to further develop and strengthen an already existing system to be accomplished on a departmental need basis. The patient care department located within Ball Memorial Hospital is currently the strongest wireless department already connecting 80 percent of its network access as wireless. Overall, the health-care sector is still in Stage 2.

Cardinal Health Systems is a growing organization with high interest in the creation of a networked community in Delaware County. Cardinal Health Systems has a strongly developed network and is eager to strengthen its role in the community and ties to other communities forming networks.

*Conclusion*

Overall, the finding in this report show current access is adequate. Delaware County is a strongly developing community that has reached the status of development in many sectors. The community has great enthusiasm for continued growth and improvement. But, there is much work to be done. Computer ownership and Internet access is rapidly growing city/county wide. However, there are still sectors that are not adequately connected. The ultimate goal is access to current and new technological tools and steps must be taken to expand access to the information sources.





Muncie has infrastructure, but how does it use that infrastructure? The physical network in a community may represent the reality of the community—or simply an opportunity. The question addressed in this section is how well the community uses the infrastructure.

*Factors Considered*

*Business*

According to the CSPP study used as a benchmark, in a fully networked community:

Businesses incorporate the Network into every aspect of their operations, creating greater efficiencies, spurring innovation, and connecting online to everyone that is part of the business, both internally and externally.

In contrast, at Stage 2:

- 25 percent [of businesses] order goods online;
- 25 percent transact with customers online;
- 25 percent manage human resources/administrative information online.

*Government*

In the fully networked community, according to CSPP:

- Governments use the Network to run operations more efficiently internally and to serve constituents 24/7 externally.
- In a community at Stage 2:
- 25 percent of [government] agencies have transactional Web sites for citizens and suppliers;
- 50 percent of agencies share data electronically;



- 50 percent of agencies manage human resources/administrative information online.
- K-12 Education
- CSPP suggests that in the fully networked community:
- Schools use the Network to connect students, teachers, and parents; improve learning using digital content; and manage administrative responsibilities more efficiently.

At Stage 2, citizens will find that:

- 25 percent of schools have an interactive Web site, including access to homework assignments and e-mail contact with teachers and administrators;
- 50 percent of teachers [are] trained to use digital content and Web-based learning for instruction;
- 50 percent of classes use digital content and/or Web-based learning.

### *Higher Education*

Higher education in the fully networked community will reflect these values:

- All aspects of higher education are available through the Network, including instruction, content and administration.

At Stage 2, these factors will characterize higher education:

- 50 percent of campuses offer on-line registration;
- 50 percent of faculty [are] trained to use digital content and Web-based learning for instruction;
- 50 percent of classes use digital content and/or Web-based learning.

### *Health Care*

- CSPP associates these characteristics with health care in the fully networked community:
- Providers interact with their patients online and perform some consultations and procedures remotely.

In the Stage 2 community:



- 25 percent of [health care] providers have an informational Web site;
- 10 percent of providers store records electronically.

### *Home*

- In the fully networked community:
- Community-based organizations are able to use the Network to engage people in the community and make their services available to everyone.

In a community at Stage 2:

- 50 percent of community-based organizations have an informational Web site.

### *Using the Network in Muncie: Applying the Factors*

#### *Business*

After analyzing the information of over 140 businesses, all of which are members of the Muncie Chamber of Commerce responding to the Network Use Survey, 24 percent of the surveyed businesses order goods from other suppliers online. This percentage places businesses in Stage 2 of the matrix, and is at relatively the same rate for all business sizes. Also, 24 percent of businesses in the Muncie area transact with customers online, offering product support, sales, or a combination of both. These business transactions place Muncie in Stage 2 of the matrix. When looking at the businesses with more than fifty employees, this number jumps dramatically. Of the more than thirty-five businesses with more than fifty employees, more than 80 percent transact with customers online, which places this portion of the community well into Stage 3. Finally, 56 percent of the businesses that answered the Muncie Network Use survey manage human resources and administrative information online, and the percentage is only marginally larger for those businesses with more than fifty employees. This online information includes the posting of prospective employee information (24 percent), prospective employee applications (7 percent), current employee benefits and personal information (7 percent), and current employee general information (18 percent). This percentage of



businesses placing human resources and administrative information online places Muncie's businesses in Stage 3 on the matrix.

*Government*

The City of Muncie provides a variety of information on its Web site, such as a department list that includes: addresses, phone numbers, and a contact person. There are, however, only three departments within the city that have an established Web page: the Building Commissioner, the Community Development Department, and the Mayor's Office. The Web sites for the Building Commissioner's Office and Community Development Department are currently under construction, and contain little more information than a contact person. The homepage for the Mayor's Office contains small amounts of information, such as office hours, with no outside informational links. The page for the Muncie Police Department is the most informative--it contains a variety of information that is useful to the public, such as a variety of different divisions within the police, Crime Stoppers, and professional standards.

The Delaware County Government has several offices online that provide information to the general public. For instance, the county homepage has a variety of links that include offices within the county, an employee search directory, and various links for businesses and services in the community. By using the community forum button, visitors to the site are also able to provide personal input on issues within the community. The listing of county departments includes a notice at the top stating that all departments will soon be up and running with their own pages. The ten departments that do have a Web page are splendidly set up with information that includes a set of frequently asked questions (FAQs). One aspect that is different about the county Web page from the city Web page is that the county also has its human resources information on the Web and lists the jobs that are currently available, along with a printable application. The employee directory allows an employee search based on department. The community links provides a variety of different options such as links to a large number of businesses in the community are present, for example the Muncie Chamber of Commerce. There are also links to the school corporations and institutions of higher education



within the county. A list of phone numbers for the various homeowners associations is also present on this page.

*K-12 Education*

The majority of the school corporations (5 of 6, or about 83 percent) within Delaware County have informational Web sites. These sites vary a great deal in the amount and type of information that is available. At this point, the school corporations in this area are located within Stage 1 of the matrix in terms of Web pages. The schools are however at very different stages in terms of the use of digital content within the classroom. On average, the schools are located at Stage 2, with some being higher, while some are much lower. One idea that school corporations have tried is to incorporate is to allow the students at the middle school and high school levels to maintain Web pages for their schools. This strategy can be incorporated into the classroom structure and allow the students to learn more about Web design and being connected to the rest of the world via the Internet.

The Daleville Community School Corporation’s Web site contains a variety of information on all schools in the district. The design is based upon a corporation template that offers a large range of information, including school quick facts (attendance records from the previous year, class sizes, special classes, programs, resources, awards, and community services). Also, there is an assortment of different options for all viewers of the site, making it an informative option. The links cater to all site visitors, from the parent who hopes to stay informed about their child’s educational experience to the student who looks to find information on school activities. There is also a section within the Web site that allows for the students to publish personal Web pages.

Muncie Community Schools has a Web page based on district-wide data. Individual schools have links from the corporation home page, and the data listed under these links includes only the name of the school and that of the principal. The corporation includes on its homepage school and program information, a calendar of events, and online job postings.



Delaware County Community Schools has a large amount of information linked from its homepage. There are information listings that move from corporation-wide down to each individual school and grade Stage. All the sites include pages that are aimed at students at the school and are used to keep students and parents better informed about the events and happenings at the school. The most extensive page created is for Delta High School. This site contains pages that include the guidance department, a calendar of events, an athletics page that includes all the individual sports, a student area, faculty and staff listings, and school announcements.

There is an interesting diversity of information on the Cowan Community Schools Web site. The elementary school does not have its own page within the corporation Web site, while the Jr./Sr. High School does. This page includes sections on academics, extra curricular activities, an F.Y.I. page, and a faculty and staff listing. The F.Y.I. page includes information such as weekly activities, lunch menus, a daily schedule, yearly calendar, and a mission statement.

The Liberty-Perry School Corporation has extensive information on its Web site. There is, at this point, a five-year technology plan that catalogs current technology inventory and projects inventory future. Another interesting aspect of the Web page is that the high school page includes a list of the teachers and their schedules throughout the day. This posting of teacher schedules is an innovative way to let parents find out which teacher their child has for a subject or to allow them to find the best time during the day to contact the teacher with any questions or concerns.

The Heritage Hall Christian School Web page contains very little information beyond that which could be found just by looking the school up in the phone book. There is a page that contains information on school history and a "Contact Us" page. There is also an "Under Construction" page that will list the coming school events.

The Indiana Academy for Science, Mathematics and Humanities includes a variety of information that will keep parents better informed. This page is also apparently used as a recruitment tool for prospective students and includes information on the school's mission and curriculum, a calendar of preview days, applications for admittance, the student handbook, staff



listings, and a course catalog. The Academy is operated by Ball State University, which gives it an advantage over some other schools in access to technology and technical support.

*Higher Education*

Both public institutions of higher education in Delaware County maintain Web sites. The services available upon these sites vary, however. In terms of online registration, both schools are in Stage 1 of the matrix. Ball State University leads the way with a Web page that contains the widest range of information and which allows online access to many services. For instance, the university allows students to register for classes online, and Ball State now has an online admissions application available.

Ivy Tech State College does not have many services offered on their Web site and do not offer an online application or online class registration. The Ivy Tech Web site is primarily used as an informational site.

Indiana Business College offers an online application and also has applications for scholarships online. The business college does not, however, have online registration for students.

*Health Care*

When looking at the health care providers that maintain a Web site, business size definitely matters. The health care providers that have informational Web sites on the Internet are usually larger in scale, while very few small, local doctors or dentists have a Web page. Approximately 10 percent of the health-care businesses/doctors in Muncie-Delaware County have informational Web pages. It is important to understand, however, that those businesses include Ball Memorial Hospital and the multiple clinics and pharmacies that it controls. Those operations all maintain always-on connections and are making increasing use of network facilities in patient treatment and practice management. Physicians in some specialties can review certain records remotely, allowing them to consult on patient care at multiple locations



Mike Shiveley of the Information System Department at Cardinal Healthcare Systems stated that CHS is progressing nicely in the way of becoming up-to-date with technology. The nurses and physicians are networked so that they can see patients' records and document them online. Since privacy is also an issue, these files can only be accessed with the proper authorization. Satellite and wireless communications are also present with the BMH and CHS corporations. Specific staff is also given e-mail addresses.

Cardinal Healthcare Systems also has centralized billing and scheduling of appointments within the corporation. This benefits the customer, as well as the doctors, in that if three tests need to be scheduled, they can be scheduled back-to back. The centralized billing also allows for simplification in the billing process for the customer, as patients do not have to worry about billing from a variety of different doctors. Technology is becoming integrated into all types of health care, with fifteen to twenty new applications been added over the last 3 years; those include homecare, central billing, and Caregiver (a nursing documentation system). The Caregiver documentation system is currently linked with PCs in the Cooper Science Building on Ball State's campus, so that those in pre-med can become accustomed to the new technology being instituted within the medical field. The onset of new technology and computer programs now allow the medical field to become more efficient. Nurses, physicians, and patients have access to medical information at the click of a button on the computer. Connectivity of medical firms to the community offers an invaluable service, allowing interaction and education for all.

Cardinal Health Systems and the related hospital have added a Web-developer the staff and will and charged that person with updating and maintaining the site. Shively hopes that this staff addition will result in a consolidated design, job postings, career opportunities, a physician finder, and things of this nature. At this time, there is even a message board where family members can communicate with patients.

Because of the limited networking of the independent providers in the county—including many other pharmacies, most of the nursing homes and many individual physician practices, however, the net status of Muncie on the CSPP matrix is close to Stage 2.



*Home -- Community Based Organizations*

A majority of the major community-based organizations (CBOs) in Muncie are online. Approximately 74 percent of the CBOs of Muncie-Delaware County are online with informational Web pages. This percentage places the county in Stage 3 on the matrix for network connectivity. The United Way of Muncie Web site lists many of these and has links to the other CBOs; it has done an excellent job in subdividing Web sites into categories, such as community based, local businesses, etc. Applications and services that these organizations offer include information about the organizations, contacts, current news, donations, and how to join. The ability of these community based organizations to spread their ideologies and let their presence known via the internet allows more citizens of Muncie to be able to access and become involved with the community.

Katie Frederick of United Way of Delaware County is currently trying to inform the non-profit organizations of Delaware County with the United Way Community Tech-Link program. This program informs non-profit organizations about technology and how to communicate via the Internet. The United Way has helped these organizations by researching technology plans, comparing pricing by providers, solving hardware/software problems, and recommending technology for purchase. The program is all volunteer-driven with help from Ball State's Computing Services Department and funding from BSU, helping to teach anyone in Delaware County how to use Word or the Internet. Some non-profits will pay for Internet access, while others will use a free Internet provider, such as NetZero. Ontario Corporation, a prominent business in Muncie, has bought a server where the non-profits can post their Web pages at no charge. Individual non-profit organizations are only required to update their own Web pages, for it is not the responsibility of United Way to keep the pages updated. The United Way is also working with the Muncie Chamber of Commerce to get a community portal page. This arrangement will allow multiple organizations and businesses within Delaware County to be linked together.







Networked communities, where people use the physical infrastructure to create virtual communities that mirror the existing, physical communities, may change how we interact with government, how we network with friends, how we interact with our children’s schools and how we advance our own education. The Internet has already changed the economy, however. People order products on-line, obtain information about other products on-line, search for jobs on-line and manage their bank accounts and securities on-line. Many businesses provide basic information on their products and services on-line. An increasing number sell products on-line and many use the Internet and e-mail in customer and product support functions. This section examines the economy in a networked community.

## Factors Considered

### *Innovation*

Many people who think of the Internet and business immediately think of the new businesses that relate to the Internet and the hardware that makes it function—they think of companies like Microsoft, Intel, Cisco Systems, Amazon.com, eBay and eTrade. The effect of the Internet on business, however, goes far beyond the creation of new industries, new businesses and new companies—it has allowed many companies in other fields to change the way that they do business. From gas stations where one can purchase fuel and order a carwash without ever leaving the gas pump to on-line stores offering once-hard-to-find products to the instant availability of stock quotations to anyone with a computer, the Internet changes the way that individual people and whole businesses relate to the larger economy. The “innovation” factor considered here focuses not on the kind of innovation that created the micro-processor but on the kind of innovation that has changed business practices, working environments and customer service in businesses that sell widgets and fix windmills.



## *Workforce*

### *Access and Training*

The Internet has become an important tool for research and communication and many workplaces have added the Internet to enhance their operations. Two principal factors, access and training, affect the use of the Internet by workers. Just as the Internet has changed other business practices, however, it has changed some employment relationships. It has made distance relationships between employer and employee practicable in many circumstances where it could not have worked before.

The rapid increase in technology and Internet use has allowed for a new workforce to enter the economy: telecommuters. Telecommuters work at home during the day for all or part of the workweek, employing telecommunications to avoid the traditional commute to spend the day in the traditional office. The term teleworker is often used interchangeably with telecommuter, but encompasses much more than working part-time from home. Telework includes work performed wherever it is necessary to meet a client's needs (<http://www.telecommute.org/aboutitac/alive.shtm>).

The 2000 Telework Association (TWA) Conference research results indicate that 16.5 million Americans are regularly employed teleworkers, with 17 percent of those new to this type of work. There are three main types of teleworkers: solely home-based, solely based at telework centers, and those that split their time between both. The organizations that employ teleworkers have increased in size in the past few years ([http://www.telecommute.org/twa2000/research\\_results\\_key.shtml](http://www.telecommute.org/twa2000/research_results_key.shtml)).

The highest percentages of teleworkers are found in the New England, Mountain, and Pacific states. On average, teleworkers earn higher salaries than non-teleworkers. Males are predominant among home-based teleworkers (65 percent of the total), although females constitute the majority of the new teleworkers. Slightly more than 85 percent of home-based teleworkers perform a significant portion of their work during non-business hours ([http://www.telecommute.org/twa2000/research\\_results\\_key.shtml](http://www.telecommute.org/twa2000/research_results_key.shtml)).



Employers propose many reasons for instituting telework as a part of their business function. Telecommuting can save on office space, improve productivity, increase personnel retention, and increase the potential to recruit new employees. Whether or not telecommuting is the answer for every office, experts predict that the number of telecommuters will double by the year 2004 ([http://www.telecommute.org/twa2000/research\\_results\\_key.shtml](http://www.telecommute.org/twa2000/research_results_key.shtml)).

### *Administration*

The Internet can also be used to recruit new customers, employees, or investment in businesses. Many of Muncie's businesses maintain a Web page. Prospective employee information can be found on 64% of the Web pages of businesses responding to the survey. Applications can be found on 19% of the Web pages and another 19% list employee benefits and personnel information.

### *Consumer*

As with many other aspects of life, the Internet has changed the way in which people purchase goods and services. The Internet has also opened up the opportunity for people to gain information about a wide variety of services and products. Many aspects of Internet purchasing and service use benefit the consumer in a variety of ways. Electronic commerce will reach about \$350 billion by 2002, from an estimated \$22 billion for this year. (Forrester Research, Inc. as reported in Business Week, June 22, 1998). Possible consumer uses of the Internet include: (CSPP [http://206.183.2.91/projects/cspp\\_gec/benefits.html](http://206.183.2.91/projects/cspp_gec/benefits.html))

- using the Internet to learn more about a product before driving to the store to purchase;
- placing an order online and having the product physically shipped to the front door;
- ordering and receiving software, music or a video without ever leaving the house;
- participating in a degree program from a college hundreds of miles away; or
- renewing a driver's license at a kiosk on the corner.

## *Benefits*

Through the use of the Internet, consumers have a greater selection and a more convenient method of purchasing. Consumers have the ability to gather a great deal of information and compare products. Another benefit to the consumer is that competition is greater which reduces prices.

Since the consumer does not have to leave the house to make purchases, the Internet greatly increases the convenience of purchasing. Another factor in the convenience of online purchasing is that the consumer is not limited by business hours. The Internet is available 24 hours a day, 7 days a week. Also, the consumer is not limited to the selection in a certain geographical area, totally removing the criterion of location from the selection equation. The only limitation is that the products have to be available through the Internet, and the number of these products is greatly increasing every day.

Through the greater selection and convenient access, the consumer can be more informed. Information about various products and services can be found much more easily compared to conventional methods of information collection and product comparisons, helping the consumer make more educated choices.

With the ease at which business can use the Internet to reach potential customers, more business can participate in consumer's selection process. With more business comes greater competition, which leads to a higher level of quality of goods and services and reduced prices for the consumer.



# Muncie in the Networked Economy: Applying the Factors

## *Innovation*

Has the widespread use of the Internet changed the way businesses in Delaware County operate? How long does it take to procure business permits and licenses? Are there programs in place to help create new businesses and help expand existing businesses? An e-mail survey sponsored by the chamber of commerce, and student research seeks to answer these questions.

- Chamber of Commerce affiliated businesses that have changed practices due to the Internet.
- 60% of businesses have changed their external business practices in at least a minimal way.
- No data was able to be collected on internal business practices and the Internet.

## *Business permits and licenses*

- The office of Regulatory Ombudsman has been established to help decrease the time and red tape of acquiring building and environmental permits.
- Air pollution permits may take an estimated 1.5 to 18 months.
- Building permits may take an estimated 10 days or less
- Water Pollution Permit may take an estimated 2 to 6 months
- Retail Merchants Certificate – is required in order to sell taxable goods. An account is established by which sales tax collected on taxable items is reported to the Department of Revenue. The number issued on the certificate serves as a tax-exempt number as well. This application form is also used to establish an account for reporting withholding tax. The fee is \$25 and takes less than a week.
- Articles of incorporation – To incorporate a business, Articles of Incorporation are filed with the Secretary of State's Office. Incorporation allows a business to be covered by the

corporate veil of Indiana. The fee is \$30 for a not for profit corporation and \$90 for for-profit corporations and takes 1-2 days.

## *Workforce*

Of the respondents to the survey, nearly half of the businesses report that more than 75 percent of their workforce has access to the Internet. In contrast, 43% of the businesses offer Internet access to one quarter of their employees or less. Many businesses also offer Internet training to develop effective users of this resource. While over half of the responses indicate that no training is offered or required of their employees, 11 percent of the businesses offer training semi-annually or more. Another 9 percent offer or require training annually and 6% every three to five years.

The responses to the survey indicate that telecommuting has become a part of Muncie's economy. Nearly one-third of the businesses surveyed report that anywhere from one to ten employees telecommute or work part time from home. A much smaller percentage report higher figures, though just over 2 percent indicate more than fifty employees telecommuting.

## *Consumer*

It is difficult to obtain specific data on Internet consumer shopping and other behavior for consumers in a particular geographic market. Thus, the analysis in this section is extrapolated from national data sets.

According to data collected by The Conference Board, approximately 34 percent of United States households made at least one purchase online during the last year. Driving the online buying force were those ages 25-34, with 55 percent of that age group having made an online purchase last year. With 45 percent of those between the ages of 35 and 44 purchasing online that age group was the second most common to make online purchases.

Income also factored into the likelihood of a person making an online purchase. Following past trends, the higher income brackets accounted for the most online purchases. However, those



householders in the \$25,000-\$34,000 income bracket saw a significant increase in purchases online, increasing from less than 18 percent to almost 29 percent.

Different parts of the country had different purchasing habits. The Pacific region had the highest percentage of household purchases at 42 percent. The East North Central region accounted for about 35 percent of purchases online, increasing of more than 12 percent from previous years.

Four main goods and services comprise the majority of online purchases. The most common purchase was books, with 45 percent of those making online purchases having bought at least one book during the past year. Approximately 30 percent of purchases came from travel-related services. CDs sales accounted for the third most common purchase at 27 percent. Computer hard/software rounded out the list of common online purchases, decreasing from 32 percent to 26 percent of online household purchases. As for total expenditures of online purchases, the list of top sellers changes slightly. According to the Wall Street Journal / Jupiter Communications, July 1999, the product categories accounting for the most online dollars spent were: travel with nearly four billion dollars in sales, PC hard/software with 3.61 billion, and Books with 1.14 billion dollars of sales. The next highest category was miscellaneous or other goods with 1.09 billion dollars in sales.





# World Enablers



The World Enablers component of the Networked Communities assessment is concerned with ubiquity, security, privacy and policy. The concept of enabling in this context is to create an environment that is conducive to the integration of all people, groups and communities into the larger network.

## Factors Considered

### *Ubiquity*

Ubiquity focuses on the ability to access the network at home or in public. Where residential accessibility to the Internet is limited, then the networked community will have publicly accessible terminals throughout the city. These terminals should have “always-on” connections, and a number will be accessible twenty-four hours a day. Possible locations for terminals are inside libraries, banks, hospitals, grocery stores, and gas stations. Kiosks in prominent outdoor locations, such as in front of a city hall or courthouse, enhance ubiquity by making the service available 24/7, much like an Automatic Teller Machine or pay telephone.

### *Security*

One of the largest barriers to connectedness is concern about security. When people relied primarily on dial-up connections, they were connected for short periods of time and the security risks were largely limited to information that a user might disclose over an inadequately secured connection—information like a credit card or social security number. With T-1 lines, DSL connections, cable modems and other “always-on” connections, computers are vulnerable to security breaches all the time—or at least all the time that they are on. Frightening stories of “hackers” who delete or steal files, crash hard drives, or implant viruses are a legitimate concern to many people. A responsible community will use security devices and provide individual users with information and education about security protection. Available security



measures available include software and hardware firewalls, encryption for sensitive email, virus protection software, and secure digital signatures.

To have a computer connected to the Internet is like having a major public thoroughfare going past the front door of a home. Anyone can come by and, if there is no security, come in. A "firewall" is a piece of hardware, software or combination designed to filter information that comes into and goes out of a computer or local network. There are different types of firewalls that block different types of access and a network can have a hardware device that blocks all outside connections on certain channels or ports.

A simple firewall blocks port 139, which keeps outside users from accessing any local Windows file shares. More complex versions block all ports from outside access. Another type of a firewall is an application firewall which blocks certain programs that run on internal network machines that leave computers susceptible to attack. Many Trojan Horse applications such as "Back Orifice" are held in check by an application firewall that would otherwise allow the hacker control over the machine.

A combination of firewall hardware and software solutions keeps computer networks fairly safe from mischievous computer users. This precaution is essential for always-on connections such as T1, DSL, or Cable Internet connections. A dial-up connection generally changes the IP, or network address, which leaves a hacker out in the cold. A simple disconnect and dialup up again eludes many hack attempts.

Beyond simply blocking outside connections, data can be encrypted so that even if it a message intercepted on its path to the recipient, the information is rendered useless. Although today's users are generally cautious about sending secure data, some users need to do so—and they need encryption. One simple technique of e-mail encryption that can be used is PGP, Pretty Good Privacy. This method enables an encrypted message to be sent through the acquisition of a public key. The public key is used to encrypt the message and can only be read by using an individual's private key. This method is called "pretty good", because it is. Being more than acceptable for personal and some corporate uses, PGP is not acceptable for top-secret information.



Another form of encryption is SSL, or Secure Sockets Layer. SSL is used in Web browsers for bank transactions, online purchases, and health information. Whenever private information is transferred, SSL is a more secure way to make the exchange. SSL and HTTP-S, a secure form of hypertext transfer protocol, are almost the same to the end user. Web sites that begin with https:// rather than http:// use one of these secure technologies. During normal Web surfing information is transmitted openly from source to destination with a possibility over being intercepted along the way. The secure method creates a connection directly from client to server. SSL does so for a longer connection; HTTP-S sends on secure piece of information and then returns operation to normal.

Another security concern is protection against viruses. Viruses give computers a cold, just as they do to humans. Viruses have been around as long as computers have existed. Viruses are small pieces of code that can delete information, cause a system to crash, or even render the hardware useless. Viruses can cause serious damage to a network; critical networks, such as those used by hospitals, the military and major financial institutions, have extensive devices to protect against viruses. Numerous anti-virus programs are also available for individual users. The programs check for strange computer activity and 'fingerprints' left by viruses. Viruses leave detectable patterns. Once a virus is identified, the software that restores the system to normal can often also eradicate it. Muncie should not have an issue with major viruses. Consumer and professional grade anti-virus software packages are easily obtainable at a reasonable cost. Additionally, the skill required to install the software and maintain it is little more than a general knowledge of computers.

## *Privacy*

Privacy issues develop when companies collect information about visitors to Web sites and then sell that information to other companies. The first step to alleviate privacy concerns is to encourage any Web site that collects personal information to post a policy explaining how that information will be used. Users of the sites must be made aware of their rights, and the option to refuse sharing personal information. There are independent organizations that certify Web sites as being legitimate, two of which are TRUSTe and BBB Online.

The issue of privacy is closely related to security--often security issues stem from a need to protect privacy. For example, the security concerns of online shopping generally stem from the privacy of the number rather than the protection of the non-tangible number. The way in which Web site operators, or Webmasters, use personal information such as an e-mail, address, name, or credit card number, is of major concern to many organizations.

Many online-based organizations are working to make the Internet as legitimate as their brick and mortar counterparts. One such organization is TRUSTe. Webmasters that adhere to its privacy principles are able to display the trademark logo to inform visitors about their compliance. The principles TRUSTe certified Web sites must follow are listed below.

- Adopting and implementing a privacy policy that factors in the goals of your individual Web site as well as consumer anxiety over sharing personal information online.
- Posting notice and disclosure of collection and use practices regarding personally identifiable information (data used to identify, contact, or locate a person), via a posted privacy statement.
- Giving users choice and consent over how their personal information is used and shared.
- Putting data security and quality, and access measures in place to safeguard, update, and correct personally identifiable information.

These fairly broad concepts allow Webmasters freedom to create personal policies. To make results more relevant, even search engines collect simple search information. Many Web sites also use cookies to store information about a user. This information can be recalled when a visitor returns to that site. Through this dialogue, a Webmaster can collect not only a great deal of personal information such as address, but also browser version and possibly purchasing habits. One of the marvelous features of the Internet is that users can opt-out or simply not visit Web sites that do not clearly define how your personal information will be used.

*Public Policy: Putting the Factors in Place*

Public policy creates the environment in which community networking can take place. To create a truly networked world, local, state, national, and international governments will have to work together to create a global community. However, to expand the current networking



capacity, there are steps that need to be taken in the interim. State legislatures need to create a clear and comprehensive legal framework with regard to networking capability and provide adequate funding to local communities to implement the proposals. Policy makers, business leaders, and active citizens need to cooperate to foster a supportive environment for the next generation of Internet technologies.

Unlike most traditional forms of communications and utilities, government or independent agencies have never heavily regulated the Internet. Therefore, the Internet has been free to develop as the market has seen fit, and it has evolved and expanded to become an everyday experience in many Americans' lives. While the Internet has become more and more accessible, most people function in both networked and physical ways. Concerns that have limited the scope of the online world center around security, privacy, and the amount of trust that technology can offer.

The nation, states, local communities, and private groups need to cooperate to develop the legal framework that is necessary to further expand the network to everyone. Issues that must be addressed in the coming years through the public process makers include taxation, competition, intellectual property rights, security, and online criminal behavior, among others.

As networks and computer availability become ubiquitous, public policy concerns arise regarding accessibility to certain materials. Many communities are concerned about preventing minors from obtaining access to obscene or even offensive material. Some communities and public providers take the position that public resources ought not to be used to provide access to sexually oriented material, even for consenting adults. Because Internet content comes from all over the world and is essentially unregulated, states and communities that want to address the accessibility of such material generally must address the issue on the receiving end. As reported in the State Net Capitol Journal on January 29,2001, the Arkansas House lawmakers introduced a bill (HB 1003) to require public schools and libraries to install Internet filters or to buy Internet access from a provider that filters its content on any computer used by children. (Democrat Gazette)



As reported in the State Net Capitol Journal on December 4,2000, Alabama Governor Don Siegelman (D) will ask the Legislature for \$9 million, enough to provide the equipment to connect every public school classroom in Alabama to the Internet in the next three years. (AP)<sup>ii</sup> As the following excerpt from an article authored by Scott Mackey demonstrates, states are concerned with the loss of sales tax revenue caused by the Internet. The growth of Internet commerce may provide new challenges to the local options sales taxes. Under the current system, states and localities cannot require Internet or mail order sellers to collect state and local sales taxes on purchases unless they have a physical presence in the taxing state. As Internet commerce grows, governments fear that they will loose sales tax revenues. One proposed solution would require that legislatures impose a single state-local sales tax rate in exchange for the authority to collect taxes on remote sales. Since this problem cannot be solved without federal legislation, this issue may remain unsolved for some time. (NCSL Legis Brief. Local Option Sales Tax. September 1, 1998. Vol. 6, No. 34.)

Communities on the cutting edge have created strategically located Internet cafes and kiosks to provide easy access, but the truth is, there are simpler methods which can be as effective in accomplishing high-tech ubiquity. For instance, libraries, educational facilities, hospitals, banks, malls, supermarkets, and gas stations are other generally accessible locations for offering Internet connections. Twenty-four hour accessibility is ideal wherever the Internet stations may be located, but that goal can be achieved incrementally.

*Enabling the Muncie Community: Applying the Factors*

*Ubiquity*

Currently, Muncie’s public libraries provide free Internet connections to city residents using either dial-up or dedicated lines. Non-residents must ascertain library membership (with a one hundred dollar annual fee) before they are able to use library terminals.



Within Delaware County, Eaton, Yorktown and Daleville provide several other computer terminals for public use at their libraries. Wright Memorial Library in Yorktown, the state’s newest library, is currently staffed by volunteers and will begin to receive funding this summer. It will then have the capability of expanding its technical resources. The annual membership is forty dollars for those who do not reside within Mt. Pleasant Township. City residency is not required for Internet use at Daleville’s Public Library because it is not a tax-based library. Any household can obtain an annual membership for fifteen dollars. Hours vary by library, as do number of computers with Internet access.

<b>Library Branch</b>	<b>Location</b>	<b>Phone</b>	<b>Computers</b>
Bracken	Ball State Campus, Muncie	285-7828	44
Carnegie	301. E. Jackson, Muncie	747-8200	12
Daleville	SR 67, Daleville	378-1570	4
Eaton	500 E. Harris, Eaton	396-3490	n/a
John F. Kennedy	1700 W. McGalliard Ave., Muncie	747-8212	7
Vivian Conley	1824 E. Centennial Ave., Muncie	747-8216	3
Webb Hunt	1110 W. Memorial Dr., Muncie	747-8218	2
Wright Memorial	9208 W. Smith, Yorktown	759-9723	1

Since libraries afford the only publicly accessible Internet connections within Delaware County, households that lack library access lack public Internet access. Other locations, such as those that have been previously mentioned, could increase the connectivity of county residents by supplying several publicly accessible Internet terminals.

*Security*

In a January 2001 survey distributed to 800 local Chamber of Commerce members, each respondent was asked to indicate if the business or institution had a firewall to protect its Internet connection. Over three-quarters of respondents with always-on connections responded that they maintain firewalls. While all business with an “always-on” connection should have a firewall, the share of the market seems encouraging at this stage due to the transparent nature of a potential attack. Most businesses have no reason to believe that a hacker will target them; conversely many hackers target larger operations such as Microsoft corporate headquarters.



## *Privacy*

Seventy-seven of 139 survey respondents indicated their site was design to provide general information. Privacy is a concern only with those businesses that transaction business through their Web sites. Some 25 respondents indicated that they use the Web site for product sales and support; such sites typically ask for personal information such as address and credit card numbers. Only 33 percent of these businesses have privacy policies posted. Businesses that succeed on the Internet must have privacy policies and must post them. This is dearly a potential action-area in Muncie. Policy posting lends itself to legitimizing Internet commerce and will help local businesses compete worldwide. When consumers feel that an online purchase is secure and that personal information is private, they are much more likely to become regular Internet consumers.

## *Public Policy and Application*

There has not been much policy passed in Indiana that deals directly with the Internet, however, more bills are being introduced on the subject of the Internet's effects within the state. Indiana's largest source of legislation about networking is focused around public schools and other sources of public access, such as libraries.

*One section of the code addresses funding for computers in schools:*

§ IC 434-3-4: Allocation to the Intelenet Commission: "Money in the fund shall be allocated annually to the Intelenet Commission (IC 5-21-2-1) to make matching grants to school corporations or to make payments directly to vendors for Internet connections and related equipment for a school corporation."

*A separate section of the code addresses one of the issues that arises with ubiquity, which is the accessibility of certain material to minors and others.*

§ IC 20-14-1-7: Policy Concerning Internet Use: "(a) This section applies to a board of a public library that allows library patrons to use library software to access the Internet or other computer network. (c) The board of a public library shall adopt a policy concerning the



appropriate use of the Internet or other computer network by library patrons in all areas of the library.”

Indiana appears not to have adopted other public policies affecting networking and computer use.

- i Lexis Legis Brief. State Net Capitol Journal. Jan. 29,2001.
- ii Lexis Legis Brief. State Net Capitol Journal. Dec. 4,2000.





# Infrastructure Matrix



<u>Availability</u>					
<b>Coverage &amp; Capacity</b>	1	2	3	4	
Infrastructure for telephone, cable, broadcast and wireless services are fully deployed in all areas		X	X		Telephone, broadcast, and wireless cover Delaware County. Cable modem service is in Muncie, Yorktown, and parts of the county
<b>Backbone Networks</b>					
Internet backbone networks serving the community are owned and/or operated primarily by local or regional providers		X			Principal fiber optic backbones in Delaware County are owned by Comcast and Ameritech, with other providers leasing use of the lines
<b>Digital Access</b>					
High-speed digital access is available to most businesses, institutions, and residents			X		T1 and T3 lines as well as DSL available for large businesses and institutions, cable modems available for home users
<b>User Demand</b>					
The majority of residential and small business users within the community tend to rely primarily on modem-assisted access to the Internet using 56Kbps or less	X				55% of business survey respondents indicated that they are currently using 56kbps access or less. Approximately 50% of survey respondents further indicated that they had intentions of upgrading their internet service in the near future (2-3 years)
<b>Wireless Coverage</b>					
The coverage area of the voice grade wireless and digital wireless systems encompasses both the city and county		X	X		Digital and analog wireless cover most of the county
<b>Speed &amp; Capability</b>					
There is infrastructure in place supporting speeds of 1.5mbps or higher extending throughout most of the community and county				X	Local and intercity fiber optic lines run throughout the community



## Ability to Meet Demand

<b>Network Nodes</b>	1	2	3	4	
The number of local network nodes within the community are numerous and frequent interruptions do not occur			X		There are approximately 41 local network nodes located throughout the community and its peripheral area
<b>Reliability</b>					
The current infrastructure is reliable in terms of transmission interruptions and packet loss		X	X		61% of business responded that they rarely have Internet service interruptions
<b>Present &amp; Future Capacity</b>					
The infrastructure is sufficient enough to support future growth-- in other words, current infrastructure is not in use at full capacity		X	X		Cable modems, DSL, T1's all can handle many more users
<b>Wireless Affordability</b>					
Local Internet consumers consider wireless access an affordable alternative		X	X		Wireless Web services offered by Nextel, Verizon, and Sprint for an additional \$7-\$10 added to current fees (discounts available). Satellite service offered at \$40
<b>Network Accessibility</b>					
Local Internet Web sites and addresses can be reached at most times			X		Since many providers host sites, most can be reached at any one time
<b>Quality of Service Providers</b>					
Quality of internet service providers			X		79% of survey respondents indicated that their ISP provided good to excellent levels of service



# Access Matrix



<u>Home</u>					
<b>Devices</b>	1	2	3	4	
All homes passed by with cable and/or fiber Internet connections		X			
Homes with one PC/access device		X			
Homes with more than one PC/access devices					
<b>Use</b>					
Homes using the Internet		X			
All homes are using the Internet and provide multiple access sites from within the home					
<u>Kindergarten-Twelfth Grade Education</u>					
<b>Service</b>	1	2	3	4	
All computers have always-on connection to the network		X			Most computers in schools are connected to a network
<b>Devices</b>					
Each student is provided with his/her own computer in a classroom setting	X				Computer pods and labs are available in schools, but not every student is provided his/her own
<b>Wireless</b>					
50% of locations have a wireless connection to the network					
<b>E-mail</b>					
All students and faculty have e-mail accounts for internal and/or external communication			X		



## Higher Education

<b>Service</b>	1	2	3	4	
All campus computers have always-on connection to the network				X	Approximately 7,000 desktops on Ball State campus
<b>Devices</b>					
Availability of network access in all common areas and departmental offices				X	
Availability of network access in all Residence Halls				X	
<b>Wireless</b>					
50% of locations have a wireless connection to the network		X			Expectations 2-3 years nearly 100% coverage of common learning and gathering areas
<b>E-mail</b>					
All students and faculty have e-mail accounts for internal and/or external communication				X	

## City Government

<b>Connections</b>	1	2	3	4	
Percentage of city departments with dedicated connections					Less than 50% of the departments have dedicated connections
<b>E-mail</b>					
Percentage of city employees with e-mail accounts					Less than 25% of city employees have e-mail
<b>Wireless</b>					
Percentage of field employees with wireless access	X				Less than 50% of field employees have a wireless connection
<b>Public Terminals</b>					
Percentage of networked terminals available to the public	X				Less than 50% of buildings have publicly accessible networked terminals



## County Government

<b>Connections</b>	1	2	3	4	
Percentage of city departments with dedicated connections		X			100% of county departments have dedicated connection
<b>E-mail</b>					
Percentage of county employees with e-mail accounts	X				Less than 50% of county employees have e-mail
<b>Wireless</b>					
Percentage of field employees with wireless access	X				Less than 50% of field employees have a wireless connections
<b>Public Terminals</b>					
Percentage of networked terminals available to the public	X				Less than 50% of buildings have publicly accessible networked terminals

## Business

<b>Connections</b>	1	2	3	4	
Percentage of Muncie businesses with dedicated connections		X			38% of Muncie businesses have dedicated connections
<b>E-mail</b>					
Percentage of employees with company e-mail accounts					Less than 25% of Muncie Business employees have company e-mail accounts
<b>Wireless</b>					
All field employees have wireless access	X				Less than 50% of Muncie mobile employees have wireless connection

# Healthcare

<b>Devices</b>	1	2	3	4	
Computers are available to all employees and clients			X		Availability issued on need basis
All computers have always-on connection to the network				X	
<b>Wireless</b>					
50% of locations have a wireless connection to the network		X			Patient Care department has 80% wireless connections.
<b>Use</b>					
All locations provide high-speed access for communication and telemedicine purposes for all users				X	Provides network access to privileged healthcare providers
<b>E-mail</b>					
All employees have e-mail accounts for internal and/or external communication		X			28% of total employees have, issued on a need basis



# Apps. & Svc. Matrix



<u>Business</u>					
<b>Internet Usage</b>	1	2	3	4	
All businesses order goods and services online		X			
All businesses transact with customers online			X		Businesses with fifty employees or more are much more likely to transact with customers online
Management of HR/administrative information is completed online			X		
<u>Government</u>					
<b>Internet Services</b>	1	2	3	4	
All agencies provide informational Web sites	X				Delaware County has many more Web sites for departments than the city
Management of HR/administrative information is completed online	X				
<u>Kindergarten-Twelfth Grade Education</u>					
<b>Web sites</b>	1	2	3	4	
All schools provide informational Web sites	X				
<b>Digital Classrooms</b>					
Teachers trained to use digital content and Web-based learning for instruction					
Classes use digital content and/or us Web-based learning		X			Each school is at various stages



<u>Higher Education</u>					
<b>Web sites</b>	1	2	3	4	
All institutions provide informational Web sites				X	
<b>Internet Services</b>					
All institutions offer online admission applications		X			Ball State University is leading the way with services that they offer online, while Ivy Tech is lagging well behind the rest
All institutions offer online class registration	X				
<u>Health</u>					
	1	2	3	4	
Healthcare providers have an informational Web site	X				Larger corporations are more likely to have the technology to enable themselves to have more electronic applications and services
All records are stored electronically	X				
<u>Community Based Organizations</u>					
	1	2	3	4	
Community based organizations that have informational Web sites		X			United Way is under way with linking community based organizations together in a common Web page



# Economy Matrix



<u>Innovation</u>					
<b>Permits</b>	1	2	3	4	
All environmental permits attainable in less than one week	X				1.5 to 18 months depending on permit type
All building permits attainable in less than one week			X		10 days or less
All business permits attainable in less than one week				X	Granted by Secretary of State and Department of Revenue
<b>Use</b>					
Businesses that have changed internal practices due to the Internet					
Businesses that have changed external practices due to the Internet			X		60% of survey respondents have changed their external business practices at least minimally.
<u>Workforce</u>					
<b>Access</b>	1	2	3	4	
All employees have access to the Internet		X			44% of businesses offer access to more than 75% of their workforce
<b>Training</b>					
All employees offered or required to receive Internet training		X			20% of the businesses in Muncie offer training annually or more frequently
<b>Use</b>					
25% of the workforce telecommutes or works from home part time	X				31% report less than ten employees that telecommute part-time
<b>Administration</b>					
All businesses provide information for prospective employees via the Internet		X			63% offer general information and 19% post applications
<u>Consumer</u>					
<b>Online Purchases</b>	1	2	3	4	
All households have made a purchase online within the last year					United States is within Stage 2



# World Enablers Matrix



<u>Ubiquity</u>					
<b>Public Access</b>	1	2	3	4	
Ability to find high-speed public access within city limits around the clock	X				Muncie libraries provide access during daytime business hours. Connections vary from dialup to T1 at local branches
<u>Security</u>					
<b>Firewall</b>	1	2	3	4	
Businesses with always-on connections use firewalls to prevent unauthorized access			X		77% of local businesses with always-on connections have firewalls
<b>Encryption</b>	1	2	3	4	
Sensitive business and personal e-mail is encrypted		X			
<b>Virus Protection</b>	1	2	3	4	
Virus software is maintained to prevent system infection			X		Several software packages are available for effortless virus protection
<u>Privacy</u>					
<b>Web Site Privacy Policy</b>	1	2	3	4	
Web sites that collect information have a clear policy on the use of that information		X			20% of local businesses that collect information about consumers have a privacy policy posted
Web sites' privacy policies are certified by watchdog organizations such as TRUSTe or BBBOnline	X				Very few, if any local business are TRUSTe certified
<b>Community Perception</b>	1	2	3	4	
People feel they understand how to protect their privacy online		X			Several local banks allow customers to make online transactions



<i>Policy</i>				
	1	2	3	4
The state provides a clear and comprehensive legal framework for networking concerns	X			
Business leaders and policy makers are working to ensure that new policies are being created to overcome barriers to connectedness		X		Local Web sites are posting privacy policies
Regular assessments of connectedness policy are conducted by both the public and private sectors	X			





# Business Survey



<b>What business sector would you be best categorized under?</b>		
	No.	%
Agriculture, Forestry, and Fisheries	1	.7%
Mining	0	0%
Construction	12	8.6%
Manufacturing	23	16.4%
Transportation, Communication, and Utilities	8	5.7%
Wholesale Trade	2	1.4%
Retail Trade	19	13.6%
Finance, Insurance, and Real Estate	20	14.3%
Services	49	35%
<b>1 How is your business connected to the Internet?</b>		
dial up modem	74	52.9%
ISDN	18	12.9%
Cable or DSL	15	10.7%
T1 or T3	27	19.3%
no connection available	1	0.7%
<b>2 How often does the Internet infrastructure that you use experience down time or data error such as packet loss?</b>		
frequently, often daily	8	5.7%
sometimes, 1 or 2 times per week	26	18.6%
rarely, 1 or 2 times per month	86	61.4%
not applicable	19	13.6%
<b>3 Rate the quality of service from your Internet provider.</b>		
excellent	54	38.6%
good	56	40.0%
average	23	16.4%
poor	4	2.9%
not applicable	2	1.4%
<b>4 How do you plan to upgrade your Internet connection?</b>		
switch from dial up to a dedicated connection	28	20.0%
increase the bandwidth of your existing connection	23	16.4%
higher level of service is not available	12	8.6%
no plan to upgrade service	62	44.3%
not applicable	10	7.1%



<b>5 How do you communicate with other businesses online?</b>		
e-mail communication only	80	57.1%
purchase from other suppliers online	33	23.6%
sell business to business	11	7.9%
do not contact other business online	11	7.9%
<b>6 What function does your Web site serve for your customers?</b>		
	No.	%
general information	77	55.0%
product support only	4	2.9%
product sales only	4	2.9%
product sales and support	25	17.9%
do not have a Web site	25	17.9%
<b>7 What other functions does your Web site serve? (choose all that apply)</b>		
Prospective employee information	40	28.6%
Prospective employee applications	12	8.6%
Current employee benefits and personnel information	12	8.6%
Current employee general information	30	21.4%
Professional and association referrals	29	20.7%
Community and public service links	43	30.7%
<b>8 How many employees does your business have?</b>		
1-20	71	50.7%
21-50	26	18.6%
51-200	23	16.4%
201-500	6	4.3%
over 500	8	5.7%
<b>9 How many employees have access to the Internet?</b>		
very few - less than 25%	58	41.4%
about half - between 25% and 75%	18	12.9%
almost all - more than 75%	59	42.1%
<b>10 How many employees have a company e-mail account?</b>		
very few - less than 25%	69	49.3%
about half - between 25% and 75%	17	12.1%
almost all - more than 75%	47	33.6%
<b>11 How many "mobile employees" (such as outside sales or field technical representatives) does your business have?</b>		
none	54	38.6%
0-10	63	45.0%
11-20	6	4.3%
21-50	5	3.6%
over 50	6	4.3%



**12 Of the mobile employees identified in response to previous question, how many have wireless access?**

very few - less than 25%	61	43.6%
about half - between 25% and 75%	4	2.9%
almost all - more than 75%	23	16.4%

**13 How many employees telecommute or work part time from home?**

	No.	%
general information	77	55.0%
product support only	4	2.9%
product sales only	4	2.9%
product sales and support	25	17.9%
do not have a Web site	25	17.9%

**14 Do you have policies on how Web browsers, e-mail and other computer resources can be used?**

no policies	49	35.0%
no specific policies, expect employees to use good judgment	31	22.1%
yes, limited to direct business use only	14	10.0%
yes, similar to phone policies, allow limited personal use such as short messages to family members	16	11.4%
yes, prohibit browsing, downloading, receiving or sending pornographic material	19	13.6%
yes, prohibit other specific material	5	3.6%

**15 How often are employees offered or required to receive Internet usage training?**

semiannually or more frequently	14	10.0%
annually	12	8.6%
every three or five years	8	5.7%
never	69	49.3%
not applicable	24	17.1%

**16 Do you monitor employees' online activity?**

yes	15	10.7%
only occasionally	18	12.9%
only with suspicion of misuse	26	18.6%
no	58	41.4%
not applicable	13	9.3%

**17 If you collect information about online customers do you have a policy for use of this information?**

TRUSTe certified	0	0.0%
policy posted on Web site	7	5.0%
no policy established	19	13.6%
not applicable	86	61.4%
not sure	13	9.3%



<b>18 Does your business use a firewall to prohibit unauthorized access from the Internet?</b>		
yes	59	42.1%
no	46	32.9%
not applicable	14	10.0%
not sure	11	7.9%

<b>19 Who maintains your Local Area Network and outside network connections?</b>		
	No.	%
employees with other duties in the company	43	30.7%
network specialists on staff	37	26.4%
outside consultants	45	32.1%

<b>20 Who maintains your Web site?</b>		
employees with other duties in the company	40	28.6%
network specialists on staff	26	18.6%
outside consultants	42	30.0%



# Case Study: Blacksburg

The Blacksburg Electronic Village, BEV, is a public-private partnership between the town of Blacksburg, Virginia, and Virginia Tech. The BEV serves many functions for the people of Blacksburg. The network acts as an online city guide to keep everyone informed and connected. However, the BEV goes beyond just being an online calendar of community events. One of the goals of the BEV is to make communication easier and more convenient.



In 1991 Virginia Tech and Blacksburg joined forces and were on their way to creating a networked community. By 1993, after completing the necessary telecommunications infrastructure improvements and information from a test group of citizens, the BEV was ready for business.

- With 87% of residents online, Blacksburg has the highest per capita Internet use in the world.
- Blacksburg has more than a dozen providers offering various types of connections.
- Business use of the Internet, at 75%, is highest of any community of the world.

Resources available online include:

- Arts
- Organizations
- Religion
- Museums
- Sports
- Library
- Discussions
- Schools
- Government
- Village Mall
- Seniors
- Health
- Visitor's

The BEV continues its work as a networked community. Although further implementation and systems improvements are still a strong focus for the BEV, helping other communities become networked is also a driving force behind the organization.

Future goals include:

- Further enhance the virtual community as a part of the physical community
- Refine the model for creating electronic communities
- Study elements that help to make community networks self-supporting
- Provide assistance to other communities that developing community networks



## Case Study: Davis

The Davis, California Community Network is a 501 (c)(3) non-profit community service organization. The purpose of the network is to make Davis and its neighbors smarter, more creative and healthier participants in the New Information Society. The mission of the organization is to strengthen the community by helping people understand and benefit from participation in the electronic information era.

The idea of forming a community network was initiated in 1994 as the first non-university Internet Service Provider in the local calling area. It was funded by the California DOT to demonstrate the benefits of telecommuting. Now the network is headed by a Board of Directors, Executive Director, Assistant Director, and active committees. Grants, private donations and subscriber fees support the Community Network.



This site provides numerous areas to explore, including:

- A community calendar of events
- Forums for discussion
- A listing of local government resources
- Education links
- A listing of community organizations
- Serving Davis
- Links to Davis businesses

A guide for living in Davis:

- Arts and entertainment

- Neighborhoods
- Newspapers, TV, and Radio
- Visitor and new resident information
- A community journal

The Community Network is a partner on a number of special projects, including:

- "Building a Smart Community"
- "Civ Net" Civic Networking Project
- "Bioregional Watershed Decisionmaking"
- "WEAP (water evaluation and planning) to Web"
- "Weaving the Web" Migrant worker families and telecommunications
- "Arts Online"

"DCN is the greatest service to this community since the invention of the bicycle." – Anonymous



# Case Study: Tacoma

Nearly 190,000 people call the City of Tacoma their hometown. The community's Web site offers a friendly atmosphere, providing a plethora of information. The site has begun to provide several permit applications online, enabling user/supplier interaction rather than simply the provision of information. The amount of information on Tacoma's site is substantial. The following subcategories are filled with even more information:

- Current weather
- News
- Featured pages
- City jobs
- About our site
- About Tacoma
- Arts and heritage
- Things to do
- Visitors
- Quality of live
- Public safety
- Utilities
- Public works
- Human services
- Permits
- Financial
- Business assistance
- Development opportunities
- Business districts
- Business climate
- Business opportunities
- City government
- City departments
- City partnerships

The site calls Tacoma America's #1 Wired City. Tacoma's Click! Network, said to be "the largest municipally-owned telecommunications network in the nation" and is allowing the city to lead the nation in both speed and access. A news release from the Web site dated February 1, 2000, notes: "Our high-speed telecommunications network is a strong economic development tool," said the Juli Wilkerson, Tacoma Economic Development Department director.

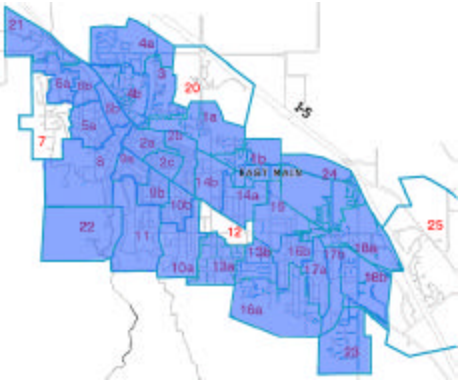
"We're seeing a number of Web-based and telecommunications industries locating in Tacoma due to the Click! Network. And, together with our tax incentive packages, low lease rates and the fastest permitting process in the region, it makes perfect sense for all types of businesses to choose Tacoma."

# Case Study: Ashland

Ashland, with a population of roughly 19,000, is located in the southwestern portion of Oregon. Tourism plays a crucial role for the city's economic base. Other contributors to the city's economic stability include higher education and manufacturing with a focus on high tech and woods products.



The city maintains a Web site filled with ample information pertaining to the responsibilities and functions of all city departments, committees, and commissions. E-mail addresses are linked for easy communication with the staff, however a chat room or forum does not exist for the community.



Among the information provided within the services section of the site is a thorough description of AFN (Ashland Fiber Network), which runs almost entirely through the city (see node map). The network is locally owned and operated and will enable the increasingly high-tech community to stay competitive with the surrounding communities.

In addition, the site includes information such as:

- City news
- Capital improvement projects
- Permits, licenses, and fees
- Various tax rates
- Citizen programs
- Agendas and minutes
- Map center
- City municipal code
- Employment opportunities
- Ongoing projects

# Case Study: Crown Point

The Crown Point Network is a comprehensive site sponsored by the city as their official on-line guide. The Network is a site for the residents of Crown Point, Indiana, to stay current on local events and information.

Resources that are available to citizens on-line include:

- Alumni Contact Service for Crown Point High School
- Listing of attractions that can be found around town
- Business directory of local services
- Classified Advertising
- Community Links
- STAR News: the Crown Point newspaper
- Discussion: an open format for posting whatever you care to discuss by e-mail
- E-cards: with local landmarks
- Events for Year 2000
- Fun in Crown Point
- Government
- History of Crown Point
- Links: to other sites about Crown Point and the region
- Local News: Newspaper, Radio, TV
- Local Weather
- Maps and Directions
- Photo Gallery: of local people, places and events
- Real Estates: listings of property available for sale and rent

Community Chat with the following discussion topics:

- CP Happenings
- CP Issues
- Teens
- Books/Reading Clubs
- Gardening, Sports
- CP Happenings
- CP Issues
- Teens
- Books/Reading Clubs
- Gardening, Sports
- Internet/Computers
- Get to Know Your Neighbors
- Social Chat
- History

# Case Study: Cardinal Health



A primary goal of Cardinal Health Systems is to give privileged physician access to their information systems via the Internet. Current area physicians already benefit from access to Cardinal Health Systems' databases. Cardinal Health Systems is willing to provide access to any licensed health-care professional providing its own computer equipment and service lines. This is a sensational concept. No longer will the Internet's use in the health-care industry be solely as a tool for searching databases on condition and prevention—as a medical encyclopedia. This potentially open network offers the opportunity to connect all physicians within East Central Indiana to information informing caregivers about the medical history of a client, compilation of all bills under one comprehensive dollar amount, and sending prescriptions to pharmacies without the hassle of a slip of paper would all be possible. Cardinal Health Systems' ability to serve remote locations in need of time-sensitive diagnoses and treatment is already in place.

The knowledge and enthusiasm to use it is what is developing. Imagine a world with a "computerized nurse" each morning evaluates your state of health and automatically sends the information to your doctor. A world in which trips to the doctor's office for trivial visits is uncommon, and when your health is showing signs of trouble a signal can be directly sent to your physician within seconds. This is a world using smart devices to manage healthcare from any location.



# Case Study: Anderson Schools

The Anderson Community School Corporation has several goals for the community. The idea is to develop Anderson into “a technology and telecommunications literate community, prepared to engage in a 21st Century economy.” The way to achieve this is to:

- Increase community involvement in public education
- Increase teacher professionalism and productivity through professional development activities
- Develop new learning environments
- Strengthen the connections between home, school, and community to foster family skills and involvement in education
- Provide opportunities for teachers and students to become self-directed and collaborative learners

Anderson Community School Corporation started an initiative called ACT NOW! in October of 1995 to integrate technology and education. There were several challenges along the way. As a part of the project, the Anderson Schools instituted the Buddy System. The Buddy System was a way to get students and parents at little or no cost, a computer for their homes as a way to keep the learning going. Several teachers were skeptical of the upkeep and safety of the systems. There was also discussion on how to get the families trained to be able to use the computer to its fullest potential. Now after the program has been in place, Anderson now has approximately 800 school children using computers at home to “extend the learning that goes on in their technology-rich classrooms.” Teachers are now avid technology users. They are now using technology to design their own curriculum and to lead staff developmental workshops.

With the help of the city’s Urban Enterprise Association, the library of Anderson has increased its numbers and its training efforts by offering sessions to students and parents. Along with the help of other community partners Anderson now sees the task of educating children and adults as a community responsibility.



# Bibliography

Cinquegrani, S. (2001). [Interview with Sal Cinquegrani, with New Edge Networks]

Cohill, Andrew, M., Andrea, L., Kavanaugh (Eds.). (2000). Community Networks: Lessons from Blacksburg, Virginia. Boston: Artech House.

Cramer, D. (2001). [Interview with Dr. Dennis Cramer, Director of University Computing Services, Ball State University]

Creasy, M. (2001). [Meeting, Delaware County School Board "Living in the Networked World"]

Draper, V. (2001). [Interview with Vernon Draper, University Computing Services, Ball State University]

Frederick, K. (2001). [Interview with Katie Frederick, United Way of Delaware County]

Gray, F. (2001). [Interview with Fred Gray, University Computing Services, Ball State University]

Hollenbeck, R. (2001). [Interview with Rion Hollenbeck, Web Page Design Consultant with Web Page Dezigns]

Hopkins, P. (2001). [Interview with Phil Hopkins General Manager for Comcast]

Indiana Department of Revenue. (317) 232-4015

Indiana Secretary of State. (317) 232-6576

InSight Communications Anderson Office

Jones, S. (2001). [Interview with Steve Jones, Professor for Ball State University Center for Information and Communication Sciences]

Karlinsky, S. (2001). [Interview with Seth Karlinsky, Senior Account Executive at DSL.net]

Lucas, G. (2001). [Interview with Gary Lucas, Chief of Muncie Fire Department]

Nextel (800) 639-8359

Richardson, A. (2001). [Interview with Alan Richardson, Muncie Cable Commission Member]

Schlake, C. (2001). [Interview with Christy Schlake, Director of External Affairs for Ameritech]

Shively, M. (2001). [Interview with Mike Shively, from Cardinal Health Services]

Undergraduate Plan Studio 401 (2001). Local Business Survey. Unpublished Undergraduate Survey. Ball State University. Muncie, IN.

Verizon Wireless (800) 466-4646

Williams, A. (2001). [Interview with Adam Williams, Head of Data Processing Department, City of Muncie, IN.

Yadon, R. (2001). [Interview with Robert Yadon, Director of the Applied Research Institute for the Center for Information and Communication Sciences, Ball State University.

### **Web Sites Referenced**

[http://206.183.2.91/projects/cspp\\_gec/benefits.html](http://206.183.2.91/projects/cspp_gec/benefits.html) February 12, 2001.

<http://navigators.com/isp.html> February 12, 2001.

<http://www.adelphia.com> February 12, 2001.

<http://www.ameritech.com> February 12, 2001.

<http://www.cityofmuncie.com> February 14, 2001.

<http://www.co.delaware.in.us> February 14, 2001.

<http://www.comcast.com> February 12, 2001.

<http://www.conference-board.org/search/dpress/.cfm?pressid=4600> February 12, 2001.

<http://www.cowan.k12.in.us> February 14, 2001.

<http://www.daleville.k12.in.us> February 14, 2001.

<http://www.delcomschools.org> February 14, 2001.

<http://www.direcpc.com> February 12, 2001.

<http://www.dsl.net> February 12, 2001.

<http://www.google.com/privacy.html> February 12, 2001.

<http://www.home.com> February 12, 2001.

<http://www.ihets.org> February 12, 2001.



<http://www.insight-com.com> February 12, 2001.

<http://www.mcleodusa.com> February 12, 2001.

<http://www.muncie.com> February 12, 2001.

<http://www.muncie.k12.in.us> February, 2001.

<http://www.newedgenetworks.com> February 12, 2001.

<http://www.ntia.doc.gov/ntiahome/fttn00/contents00.html> February 12, 2001.

<http://www.selma.bsu.edu> February 14, 2001.

<http://www.sprintpcs.com> February 12, 2001.

<http://www.starband.com> February 12, 2001.

<http://www.techtv.com/callforhelp/answerstips/story/0,23008,2436994,00.html>. January 22, 2000.

<http://www.techtv.com/callforhelp/projects/story/0,23008,2134352,00.html>. Day, Jerry. September 8, 2000.

<http://www.techtv.com/callforhelp/projects/story/0,23008,2147593,00.html>. Sargent, Martin. October 9, 1998.

<http://www.techtv.com/callforhelp/todaysquiz/jump/0,23009,2541003,00.html>. February 12, 2001.

<http://www.techtv.com/screensavers/answerstips/story/0,23008,2102081,00.htm> May 18, 1998.

<http://www.telecommute.org/aboutitac/alive.shtm> February 12, 2001.

[http://www.telecommute.org/twa2000/research\\_results\\_key.shtml](http://www.telecommute.org/twa2000/research_results_key.shtml) February 12, 2001.

<http://www.telocity.com> February 12, 2001.

[http://www.truste.org/Webpublishers/pub\\_privacy.html](http://www.truste.org/Webpublishers/pub_privacy.html) February 12, 2001.

<http://www.unitedway.org/local.cfm?id=16530&zip=47303> February 14, 2001.

<http://www.vsat.com> February 12, 2001.

<http://westview.muncie.k12.in.us> February 14, 2001.





*Ameritech Contacts*

**Christy Schlake**

**Ronnie Morrison**

Ameritech currently services approximately 47,000 customers in Delaware County—32,000 to 35,000 of whom are located within the city of Muncie. The local Ameritech branch currently supplies city and county customers with their required levels of speed to perform their network functions—depending on the specific levels of service desired by their clientele. Ameritech services are offered throughout the entire city and county.

Ameritech is capable of supplying bandwidth level supported by an OC48 or OC192 fiber optic line. T1 and T3 lines are currently the highest levels of service required/offered by Ameritech (ranging in price from \$1,000 to \$1,500 a month), however, DSL may possibly be available in the next year or two depending on the outcome of current court hearings involving Ameritech and its Opportunity Indiana 2000 project.

Opportunity Indiana 2000 is a \$578 million investment project involving the improvement/upgrading of current networking infrastructure in Indiana. The Project Pronto component of this program involves the delivery of DSL services to potential residential and business users at a rate between \$30-\$60 a month—depending on an area’s connectivity and range of services. DSL services offered in the Project Pronto proposal would be very reliable, ranging from less than 1% interruption and packet loss (within the proximity of the first 12,000 ft. of the central office) to a declining reliability level approximately 1-2% every 12,000 ft. thereafter.



Ameritech’s local budget on network upgrades/ improvements and expanding service area has consistently been around \$1.5 million in the Muncie community/ Delaware County area for the past 3-4 years. (With the possibility of Opportunity Indiana 2000 being implemented, this budget could quickly rise to accommodate higher levels of service.)

Ameritech currently offers its services to the local area schools at no cost—however, no schools appear to be using Ameritech Internet services at this time.

Comcast - Adelphia Contact

**Phil Hopkins**

Comcast/ Adelphia currently services approximately 48,000 homes in Delaware County—approximately 32,000 of which are located within the city of Muncie. The local areas currently being serviced by Comcast are: Muncie, Selma, Yorktown, Daleville, and Parker City with the densest level of use occurring in Yorktown and in the northwestern portion of the city of Muncie.

The local Comcast branch also serves approximately 3,000 @home Internet users throughout the city and county (indicating that their internet service clientele are primarily residential users). Representatives of Comcast/ Adelphia indicated that @home Internet service users usually double (or even triple) their use of the @home service within the first 2-3 months that the service is provided.

Comcast does not offer commercial Internet services at the present time; however, Comcast Commercial Online may become available within the next 6 months to one year, depending on the level of activity assumed by the new franchise owners. The Comcast representatives indicated that there had been significant community interest by local businesses in providing VPN (Virtual Private Networking) services to their employees and additionally indicated that there was some capacity with which these services could be offered at the present time.



The city of Muncie (and much of its periphery) currently has access to fiber optic lines and future plans for digital cable services indicate that the city will have these additional services offered within the next 6 months to a year. The reliability of the fiber optic lines and cables is very high—testing by Comcast/ Adepia have indicating that packet loss and interruptions occur at a frequency of 1% or less. It is also important to note that the internet service is not running close to full capacity at this time and that an additional 7,500 users would have to connect to the @home service before lower levels of reliability and infrastructure improvements would become issues.

Comcast is currently capable of supplying Internet levels of speed of up to 3.5 MB for downloading functions, 128K for uploading applications. The backbone of the Internet service connects to Indianapolis by using a radio or microwave tower. The backbone then connects from Indianapolis by optical fiber from Chicago, which runs out to Redden city, California the @home headquarters.

Comcast currently offers its services to the local area schools at no cost—however, no schools are using these services at the present time.

## *CICS Contacts*

### **Dr. Bob Yadon**

### **Dr. Stephan Jones**

These gentlemen provided information regarding a student/faculty project initiated at Ball State University—aptly named LocalWeb4u. LocalWeb4u serves as a local directory (or index) internet service in which local Web sites produced by community members are compiled into a cataloging system under headings such as education, businesses, personal and so on.

The LocalWeb4u service was projected to be online and accessible to all of its potential users by 4:00 p.m. January 26 and future plans for (exclusive) community/regional franchises are in place. Community/ regional franchises would be sold to individuals or groups that would

potentially monitor and update the LocalWeb4u Web sites and would also provide incentives for potential users via internet coupons and free service hours for posting materials on the LocalWeb4u Web site.

The representatives from the CICS department were also very cooperative in providing sources for us to contact and also aided in the process of obtaining maps for this project.

## Muncie Cable Television Commission Contact

### **Alan Richardson**

Alan Richardson was recently reappointed to the Muncie Cable Television Commission for another four-year term. He is one of the decision-makers on the commission that will be dealing with Comcast/ Adelphia in the near future (2002) concerning the establishment and maintenance of the Muncie community's continuing cable franchise.

Some of the aspects of the new franchise proposal that Professor Richardson mentioned in his interview included: the provision of more public education channels, the expansion of the number of channels provided by the franchise, the installment of a 3-5% franchise fee, a higher penetration rate (which is currently set at 70 percent), and the possibility of providing a reduced-cost, standardized cable package to potential users.

Professor Richardson also stated that the reliability of the cable connection in the community is high (perhaps less than 1.5% in terms of packet loss and interruptions) and he further indicated that the four dual counter-rotating rings of the city are easily capable of monitoring and testing the network infrastructure that is in place.

Professor Richardson concluded his statements by indicating that the current Muncie community / Delaware County infrastructure is "okay", with some improvements and upgrading needed in some areas to expand the area's capabilities. He further indicated that Muncie is much better off in terms of its network infrastructure than most other communities comparable to its size.







# Contacts

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## **ADSL (Asymmetric Digital Subscriber Line)**

Like ISDN, ADSL uses standard phone lines to deliver high-speed data communications. But while ISDN's transmission speed is limited to 64 kbps, ADSL technology can deliver upstream (from the user) speeds of 640 kbps and downstream (to the user) speeds of more than 6 mbps. Even better, ADSL uses the portion of a phone line's bandwidth not utilized by voice, allowing for simultaneous voice and data.

## **always-on connection**

Also known as a dedicated line, a telecommunications connection that lets your computer have a direct, permanent connection to the Internet.

## **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.

## **Bandwidth**

In a general sense, this term describes information-carrying capacity. It can apply to telephone or network wiring as well as system buses, radio frequency signals, and monitors. On a more human level, the term can describe a person's capacity for dealing with multiple projects ("I'd like to update this database, but I don't have the bandwidth."). Bandwidth is most accurately measured in cycles per second, or hertz (Hz), which is the difference between the lowest and highest frequencies transmitted. But it's also common to use bits or bytes per second instead.

## **Baud**

Most people use baud to describe modem speeds in bits per second--but they're wrong. They may say a 9,600-bps modem transmits at 9,600 baud, but really baud is a measure of how frequently sound changes on a phone line. Modern modems transmit more bits with fewer changes in sound, so baud and bps numbers aren't equal. However, only editors, pedants, and communications engineers now care about the distinction. But if you run into members of these groups, use bps instead of baud.

## **BNC (Bayonet Neill Concellman)**

Developed in the 1940s, the BNC connector provides a secure, easy-to-use means of connecting shielded cables to electronic equipment. BNC connectors are commonly used today in high-end video and computer networking applications.



**Bps (bits per second)**

A modem's speed is measured by the number of bits that it can transfer in a second. If your modem is rated at 9,600 bps or less, you're behind the times. Modems rated in kilobits per second now rule: 14.4 kbps is the minimum acceptable, and 54.6 kbps is the premium modem speed.

**Browser**

In brief, a browser is your interface to the World Wide Web; it interprets hypertext links and lets you view sites and navigate from one Internet node to another. Among the companies that produce browsers are NCSA Mosaic, Netscape, and Microsoft, as well as commercial services like CompuServe, Prodigy, and America Online.

**Byte**

A byte usually denotes 8 bits (also called an octet or a word), which the computer treats as a single unit. Longer sequences like 16 and 32 bits are also possible. Abbreviated as uppercase B.

**Cable modem**

Speed is something we all want on the Internet, and it also explains the allure of cable modems, which promise speeds of up to 80 times faster than an ISDN line or 6 times faster than a dedicated T1 line (the type of connection most large corporations use). Because cable modems provide Internet access over cable TV networks (which rely primarily on fiber-optic or coaxial cable), they are much faster than modems that use phone lines. But cable modems are expensive--they're expected to cost between \$200 and \$250 when they hit the retail shelves in mid-1998. And the fees from your local cable company could include a \$50 to \$100 installation fee, while the service itself costs around \$40 per month, if the service is offered at all. Some cable modem testers complain that the service is neither as fast nor as consistent as promised.

**Carrier**

This is another name for a phone connection. When you see the external modem light labeled CD flash, you know the modem is receiving a carrier detect (CD) signal, and that it's hooked up to another computer.

**Client**

This is the customer side of a client/server setup. To confuse matters, when you log on to a server, the word client can refer to you, to your computer, or to the software running on your computer. For example, to download something from an ftp site, you use ftp client software.

**Clustering**

Clustering is the act of connecting multiple computers and making them acts like a single machine. Corporations often cluster servers to distribute computing-intensive tasks and risks. If one server in a cluster fails, some operating systems can move its processes to another server, allowing end users to continue working while the first server is revived.



**Coaxial cable**

Typically used to connect a television to cable TV services, coaxial cable consists of a small copper tube or wire surrounded by an insulating material and another conductor with a larger diameter, usually in the form of a tube or copper braid. This cable is then encased in a rubberized protective material.

**. com**

- 1. A file extension used for PC programs, especially those that run under DOS (for example, command.com, win.com).
- 2. A domain type used for Internet locations that are part of a business or commercial enterprise (for example, www.cnet.com).

**COM port**

Although it's in all capital letters, COM is not an acronym. It's a contraction of communications, and it's used to describe the serial port on a PC. COM is generally used in conjunction with a number, as in COM1, COM2, COM3, or COM4.

**Connectedness**

The measure of how well connected to the Internet a person is.

**CPU (central processing unit)**

The CPU--a highly complex silicon chip ranging from the size of a matchbook to the wallet-sized Intel Xeon--is your computer's brain, taking requests from applications and then processing, or executing, actions, a.k.a. operations. The faster your processor, the more operations it can execute per second. The more operations you have per second, the faster things happen in your applications; thus, games play more smoothly, and spreadsheets calculate more quickly. Sometimes the term CPU is also used to describe the whole box that contains the chip (along with the motherboard, expansion cards, disk drives, power supply, and so on). Both uses are widespread, but only the first is really accurate.

**Cyberspace**

Science fiction writer William Gibson coined the term cyberspace in the perennial favorite novel Neuromancer. Gibson used the word to describe a virtual world of computer networks that his cyberpunk heroes "jacked into." Everyone else uses the word cyberspace loosely to refer to virtual reality, the Internet, the World Wide Web, and many other kinds of computer systems that users become immersed in. It's about as ill-defined a term as information superhighway, but it's much hipper.

**DNS (domain name system)**

When you send e-mail or point a browser to an Internet domain such as cnet.com, the domain name system translates the names into Internet addresses (a series of numbers looking something like this: 123.123.23.2). The term refers to two things: the conventions for naming hosts and the way the names are handled across the Internet.



## **Dedicated line**

Also known as and "always-on" connection, a telecommunications line that lets your computer have a direct, permanent connection to the Internet.

## **Dial-up connection**

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 Signature**

An authentication process using encryption to ensure that a communication that has been received has not been tampered with.

## **Domain name**

Looking for a domain name? You'll find it to the right of the @ sign in an e-mail address, or about ten characters into a URL. CNET's domain name is cnet.com. The domain name of daemous@pentagon.io.com is io.com. Domain names are issued by the National Science Foundation (NSF), and they come with different extensions based on whether the domain belongs to a commercial enterprise (.com), an educational establishment (.edu), a government body (.gov), the military (.mil), a network (.net), or a nonprofit organization (.org). Some domains use a geographical notation too (such as the San Francisco, California-based well.sf.ca.us).

## **DSL (digital subscriber line)**

Digital subscriber lines carry data at high speeds over standard copper telephone wires. With DSL, data can be delivered at a rate of 1.5 mbps (around 30 times faster than through a 56-kbps modem). Also, DSL users can receive voice and data simultaneously; so small offices can leave computers plugged into the Net without interrupting phone connections. Currently, DSL is expensive because specialized equipment--a splitter--needs to be installed at the subscriber's location. DSL Lite, the consumer-ready version of DSL, requires no such splitter, and promises comparable access speeds at a cheaper rate. xDSL is the collective term for different variations of DSL, such as ADSL and HDSL.

## **Dynamic bandwidth allocation**

Using dynamic bandwidth allocation, an ISDN line can handle voice and data at the same time. This way, a person downloading files from the Net could be yakking away on the phone over the same ISDN line. To make this possible, the ISDN device reallocates one of the channels used to carry data for the voice call. Once the call has been completed, the second channel is returned to data transmission so the transfer can be done efficiently. This dynamic allocation can take place only if the ISDN connection uses MPPP.

## **E-mail (electronic mail)**

Whenever you send messages to people using a computer and they read it later, you've sent a piece of e-mail. You can send e-mail in several ways--across a local area network, via the





**FTP (file transfer protocol)**

This Internet protocol is used to copy files between computers--usually a client and an archive site. It's old-fashioned, it's a bit on the slow side, it doesn't support compression, and it uses cryptic Unix command parameters. But the good news is that you can download shareware or freeware apps that shield you from the complexities of Unix, and you can connect to FTP sites using a Web browser.

**Gateway**

A gateway is a program or piece of hardware that passes data between networks. You'll see this term most often when you either log in to an Internet site or when you're passing e-mail between different servers.

**Gigabyte**

This year's minimum hard disk size is one gigabyte, or 1,073,741,824 bytes, which should be enough for Windows 95 and other modern operating systems--for a few months at least. Abbreviated as GB.

**HFC network (hybrid fiber-coax network)**

HFC networks combine both optical fiber and coaxial cable lines. Optical fiber runs from the cable head end to neighborhoods of 500 to 2,000 subscribers. Coaxial cable runs from the optical-fiber feeders to each subscriber. Hybrid networks provide many of fiber's reliability and bandwidth benefits at a lower cost than a pure fiber network. As of late 1996, about 7 percent of cable systems had been upgraded to HFC.

**High Speed Access**

Access to the Internet at transmission speeds greater than 128kbps.

**Home page**

Web sites are by nature-tangled groups of interconnected pages. To make them easier to navigate, the sites have one or more home pages that you can use for orientation. A home page serves as the site's introduction, starting point, and guide.

**HTTP (hypertext transfer protocol)**

The protocol used to transmit and receive all data over the World Wide Web. When you type a URL into your browser, you're actually sending an HTTP request to a Web server for a page of information (that's why URLs all begin with "http://"). HTTP1.1, the latest version, is currently undergoing revisions to make it work more efficiently with TCP/IP.

**Hub**

This chunk of hardware is used to network computers together (usually over an Ethernet connection). It serves as a common wiring point so that information can flow through one central location to any other computer on the network.



### **Information superhighway**

This is a buzzword from a speech by Al Gore that refers to the Clinton/Gore administration's plan to deregulate communication services and thus widen the scope of the Internet by opening carriers, such as television cable, to data communication. The term is widely and loosely used to mean the Internet, and it's often shortened to I-way, the infobahn, and so on.

### **Informational Web sites**

Web sites that only present information and do not allow for any interactivity or transactions.

### **Interactive Web sites**

Web sites that enable real-time communication and/or transactions between the user and the Web site.

### **Internet**

The Internet originated in 1969, in the midst of the Cold War, as a "nuke-proof" communications network. As you might guess, it received most of its early financing from the U.S. defense department. Now, however, it consists of countless networks and computers across the world that allows millions of people to share information. The lines that carry the majority of the information are known as the Internet backbone. While the government used to run things, now major Internet service providers (ISPs) such as MCI, GTE, Sprint, UUNET, and ANS own portions of the backbone--a good thing as they have the motivation and the revenue to maintain the quality of these large networks.

### **Internet backbone**

This super fast network spanning the world from one major metropolitan area to another is provided by a handful of national Internet service providers (ISPs). These organizations (including Net 99 and AlterNet) use connections running at approximately 45 mbps (T3 lines) linked up at specified interconnection points called national access points (which are located in major metropolitan areas). Local ISPs connect to this backbone through routers so that data can be carried through the backbone to its destination.

### **Intranet**

A play on the word Internet, an intranet is a restricted-access network that works like the Web, but isn't on it. Usually owned and managed by a corporation, an intranet enables a company to share its resources with its employees without confidential information being made available to everyone with Internet access.

### **IP (Internet protocol)**

The Internet protocol defines how information gets passed between systems across the Internet.



### **IP address (Internet protocol address)**

This address is a unique string of numbers that identifies a computer on the Internet. These numbers are usually shown in groups separated by periods, like this: 123.123.23.2. All resources on the Internet must have an IP address--or else they're not on the Internet at all.

### **IPX (Internetwork Packet Exchange)**

NetWare's network-layer protocol handles networking addressing, routing, and packets. The most common of all networking protocols, IPX loads when you log on to a network.

### **ISDN (Integrated Services Digital Network)**

The plain old telephone system doesn't handle large quantities of data, and the phone companies realized this a long time ago. So the ISDN spec was hammered out in 1984 to allow for wide-bandwidth digital transmission using the public switched telephone network. Under ISDN, a phone call can transfer 64 kilobits of digital data per second. But it's not always easy to adopt.

### **ISP (Internet service provider)**

Once upon a time, you could only connect to the Internet if you belonged to a major university or had a note from the Pentagon. Not anymore: ISPs have arrived to act as your (ideally) user-friendly front end to all that the Internet offers. Most ISPs have a network of servers (mail, news, Web, and the like), routers, and modems attached to a permanent, high-speed Internet "backbone" connection. Subscribers can then dial into the local network to gain Internet access--without having to maintain servers, file for domain names, or learn Unix.

### **Kiosk**

If the button bars, the menus, and the URL window on your browser leave too little room for the Web page you're trying to look at, it's time for kiosk mode. This mode drops all the visual clutter of your browser--its toolbars, menus, and borders--to leave more room for the Web page. It's sometimes called presentation mode, which gives a better description of its main use.

### **Kbps**

Your modem's speed is measured in the number of bits it can transfer in a second. Modems rated in kilobits per second are now the standard.

### **Kilobyte**

Although kilo is Greek for a thousand, a kilobyte actually contains 1,024 bytes (that's 2 to the 10th power). In other words, a thousand bytes is actually less than a kilobyte. Remember that the next time you download a file. Abbreviated as K.

### **LAN (local area network)**

A local area network is a short-distance network used to link a group of computers together within a building. 10BaseT Ethernet is the most commonly used form of LAN. A piece of



hardware called a hub serves as the common wiring point, enabling data to be sent from one machine to another over the network. LANs are typically limited to distances of less than 500 meters and provide low-cost, high-bandwidth networking capabilities within a small geographical area.

**Leased line**

A dedicated private line that is used primarily to link two remote local area networks (LANs) together. Unlike frame relay, this line transmits data at only one speed depending on the purchased bandwidth. Customers pay a flat monthly rate for this service.

**Mbps (megabits per second)**

This abbreviation is used to describe data transmission speeds, such as the rate at which information travels over the Internet. Several factors can influence how quickly data travels, including modem speeds, bandwidth capacity, and Internet traffic levels.

**Megabyte**

Although mega is Greek for a million, a megabyte actually contains 1,048,576 bytes (1,024 x 1,024 bytes). In other words, a million bytes is actually less than a megabyte. Remember that the next time you buy a hard disk or try to fit files onto a floppy disk. Abbreviated as MB.

**Memory bandwidth**

Generally, bandwidth refers to data-carrying capacity and is expressed in cycles per second or Hertz (Hz). In the case of RAM, bandwidth is a function of its rated speed and the size of its data path.

**MHz (megahertz)**

A megahertz is 1 million complete cycles per second. This unit is most commonly used to measure transmission speeds of electronic devices, such as the clock speed of a microprocessor, the small computer chip that handles data-related tasks.

**Mirror server**

Sometimes a Web server will receive more traffic than it can handle. When this happens, the server's administrator may add extra servers--containing identical data--to accommodate the flow. These duplicates are called mirror servers. By adding mirror servers and telling users how to access them, an administrator can keep users from receiving error messages or unacceptably slow response times when they try to access a site. Mirror servers also act as backups if the primary site goes down.

**Mirror site**

Because the Internet population has exploded in recent years, a lot of archive servers can't cope with the load. One solution is to create an exact copy of a server--a process called mirroring. Mirror sites divert some of the traffic from the original site. It's not unusual to find a dozen or more mirrors of busy ftp sites.



**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.

**Modem**

A modem is an external box or internal circuitry that converts computer data into sound that can be transmitted over phone lines. First used to send telegrams, early modems alternated between two different tones. This is called modulation, and the process of modulating (and demodulating at the receiving end) gave the modem its name. These days' modems transmit data with lots of different tones, signals, and complex mathematical processing, so modem is a bit of a misnomer.

**Modulation**

Modulation refers to the process of encoding digital data into analog signals for transmission. When transferring data over phone lines, for example, a modem modulates the data into audible tones "carried" on frequencies between 0 Hz and 4 KHz. Once the data reaches its intended destination, another modem demodulates the signal back into digital data. Cable TV networks also use modulation techniques to transfer data. But instead of audible tones, cable has sophisticated digital modulation schemes to greatly increase the amount of data that can be sent.

**NDIS**

Network Device Interface Specification  
A device driver for the Windows Operating System that allows multiple network protocols to be used simultaneously with one adapter card. Microsoft and 3Com developed NDIS because of its compatibility with Ethernet local area network (LAN) cards, but now NDIS is also used for many internal ISDN adapters, with the help of Microsoft's ISDN Accelerator Pack.

**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.

**Null-modem cable**

A special type of computer cable that lets you hook up two computers to communicate via their serial ports. It's called a "null-modem" cable because it eliminates using modems and phone lines for hooking together nearby computers. Null-modem connections are useful for file transfers, remote control, or special applications like the dual-screen mode of Microsoft's PowerPoint 97.

**OS (operating system)**

A computer by itself is essentially dumb bits of wire and silicon. An operating system knows how to talk to this hardware and can manage a computer's functions, such as allocating memory, scheduling tasks, accessing disk drives, and supplying a user interface. Without an operating system, software developers would have to write programs that directly accessed



hardware--essentially reinventing the wheel with every new program. With an operating system, such as Windows NT or Mac OS 8, developers can write to a common set of programming interfaces called APIs and let the operating system do the dirty work of talking to the hardware.

**Optical fiber**

Optical fiber cables consist of thin filaments of glass (or other transparent materials), which can carry beams of light. A laser transmitter encodes frequency signals into pulses of light and sends them down the optical fiber to a receiver, which translates the light signals back into frequencies. Less susceptible to noise and interference than other kinds of cables, optical fibers can transmit data greater distances without amplification. But because the glass filaments are fragile, optical fiber must be run underground rather than overhead on telephone poles.

**Out-of-band signaling**

ISDN normally uses a separate wire called the D channel to do all the call setup and signaling. The existence of this separate telephone network intended specifically for call signaling is called "out-of-band." In other words, the call signaling is done independently of the data-carrying B channels, which allows them to utilize their full 64-kbps bandwidth capability.

**Peer-to-peer network**

A network where there is no dedicated server. Every computer can share files and peripherals with all other computers on the network, given that all are granted access privileges. Such a network is practical only for small workgroups of less than a dozen computers.

**POTS (plain old telephone service)**

If you're logging on to the Net using a regular modem that employs your phone line, you have a POTS connection. POTS is the basic voice phone service you get from Ma Bell and her kids, and the term is used to differentiate this type of connection from ISDN or a leased line like T1.

**Portal**

A Web site that aggregates content and provides a methodology for accessing that content.

**Privacy policy**

The stated methodology used by a Web site for handling information collected on users of that Web site.

**Public domain**

Of all the kinds of software or information you can download, public domain has the fewest strings attached. With shareware, you're expected to pay a fee. With freeware, you may face other restrictions, and there's still a copyright attached. With public domain downloads (also called downloads in the pubic domain), there are no copyright restrictions whatsoever.



## **Public ports**

Publicly available data jacks where people can plug in their access devices to connect to the Internet.

### **RJ-11**

This is the standard telephone connector--a tab snaps into the socket and has to be pressed to remove the connector from the wall. An ordinary phone circuit uses two wires. The RJ-11 jack has room for up to four wires, but at a glance it's easy to mistake with the larger RJ-45 jack, which can house up to eight wires.

### **RJ-45**

RJ-45 connectors look a bit like a standard phone connector but are twice as wide (with eight wires). RJ-45s are used for hooking up computers to local area networks (LANs) or for phones with lots of lines.

## **Router**

This piece of hardware does what it says: it routes data from a local area network (LAN) to a phone line's long distance line. Routers also act as traffic cops, allowing only authorized machines to transmit data into the local network so that private information can remain secure. In addition to supporting these dial-in and leased connections, routers also handle errors, keep network usage statistics, and handle security issues.

## **Search engine**

When a user enters text into a search form, a program called a search engine analyzes the text and searches for matching terms in an index file, which was created using a search indexer. The search engine returns the results of its search using a results listing.

## **Server**

The business end of a client/server setup, a server is usually a computer that provides the information, files, Web pages, and other services to the client that logs on to it. (The word server is also used to describe the software and operating system designed to run server hardware.) The client/server setup is analogous to a restaurant with waiters and customers. Some Internet servers take this analogy to extremes and become inattentive, or even refuse to serve you.

## **Shareware**

Shareware is the wonderful alternative to commercial software. Available from centralized archives on the Internet and local bulletin board systems (or sometimes via CD-ROM or floppy), shareware is copyrighted but works on the honor system. You have a specified time period to try out the software for free; if you continue to use it, you're expected to register the program and pay a fee to its developer. (Some programs are partially disabled, stop working after a set period of time, or contain "nag screens" that pop up frequently to encourage you to register.)



## **Snail mail**

This term is used by supercilious fans of e-mail to describe the regular paper-based mail service. Since the delay between sending e-mail and receiving it can be as little as a few seconds, regular mail seems a lot slower by comparison.

## **Solid state**

Refers to any electronic circuit made of solid, singular components, such as chips and transistors. Solid state devices function exclusively with internal electromagnetic signals, and don't use any mechanical action.

## **Spider**

Also known as a Web spider, this class of robot software explores the World Wide Web by retrieving a document and following all the hyperlinks in it. Web sites tend to be so well linked that a spider can cover vast amounts of the Internet by starting from just a few sites. After following the links, spiders generate catalogs that can be accessed by search engines. Popular search sites like Alta Vista, Excite, and Lycos use this method.

## **Stateless**

A stateless server (for example, a World Wide Web server) considers each page request independently. A request specifies the entire document, without requiring any context or memory of previous requests. Unless a cookie is set, no information is carried across requests.

## **Streaming**

Data is streaming when it's moving quickly from one chunk of hardware to another and doesn't have to be all in one place for the destination device to do something with it. When your hard disk's data is being written to a tape backup device, it's streaming. When you're watching a QuickTime movie on the Internet, it's not streaming, because the movie must be fully downloaded before you can play it.

## **Synchronous communication**

Synchronous communication is the technique of choice for ISDN lines because it handles data more efficiently than the typical modem's asynchronous technique. While asynchronous communication sends smallish blocks of data with lots of control bits for error correction, synchronous techniques use big blocks of data with control bits only at the start and end of the entire transmission. But because of the minimal error checking, synchronous communicating devices must be timed to perfection, and they need a clean line. A modem used over an analog line won't handle synchronous communication well because a crackle on the line would throw everything out of sync. ISDN routers and internal adapters use synchronous communication. This allows them to transfer data up to 30 percent faster than ISDN modems, which must convert the data they receive synchronously so that it can be transmitted asynchronously through the computer's serial interface.

## **T1**

If ISDN isn't a fast enough digital carrier for you, T1 offers faster speeds. T1 is a term coined by AT&T for a system that transfers digital signals at 1.544 megabits per second (as opposed to ISDN's mere 64 kilobits per second). Of course, if T1 doesn't cut it, there's always T3. (T2 seems to have been bypassed altogether.)

## **T3**

When you're transferring data across a digital carrier, T3 is the premium way to go. It's not just three times the capacity of T1, as the name suggests--it's almost 30 times the capacity. It can handle 44.736 megabits of digital data per second.

## **TCP/IP (transmission control protocol/Internet protocol)**

These two protocols were developed by the U.S. military to allow computers to talk to each other over long distance networks. IP is responsible for moving packets of data between nodes. TCP is responsible for verifying delivery from client to server. TCP/IP forms the basis of the Internet, and is built into every common modern operating system (including all flavors of Unix, the Mac OS, and the latest versions of Windows).

## **Telecommuting**

Using networked technologies to perform work-related activities away from the office or business using information and communication technologies.

## **Terminals**

Access devices that enable the user to view Web pages and transmit e-mail.

## **Transactional Web sites**

Web sites that enable the user to order and pay for goods and services online. Digitized goods and services can also be delivered online.

## **Twisted pair**

Telephone companies commonly run twisted pairs of copper wires to each customer household. The pairs consist of two insulated copper wires twisted into a spiral pattern. Although originally designed for plain old telephone service (POTS), these wires can carry data as well as voice. New services such as ISDN and ADSL also use twisted-pair copper connections.

## **URL (uniform resource locator)**

URLs are the Internet equivalent of addresses. How do they work? Like other types of addresses, they move from the general to the specific (from zip code to recipient, so to speak). Second, is URL pronounced "you are ell," or does it rhyme with hurl? Both pronunciations are widely used.



## **Video bandwidth**

Video bandwidth refers to a monitor's ability to refresh the screen. High bandwidths allow more information to be painted across the display in a given amount of time, which translates into support for higher resolutions and higher refresh rates. Lower bandwidths result in flickering, ringing artifacts, and ghosting. To calculate the bandwidth of a monitor (measured in megahertz, or MHz), multiply the horizontal resolution by the vertical resolution, and then multiply the product of the two figures by the refresh rate. For example,  $800 \times 600 \times 75 = 36$  MHz

## **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.

## **VPN (Virtual Private Network)**

A Virtual Private Network, or VPN, is a private network of computers that's at least partially connected by public phone lines. A good example would be a private office LAN that allows users to log in remotely over the Internet (an open, public system). VPNs use encryption and secure protocols like PPTP to ensure that unauthorized parties do not intercept data transmissions.

## **WAN (wide area network)**

Take two local area networks, hook them together, and you've got a WAN. Wide area networks can be made up of interconnected smaller networks spread throughout a building, a state, or the entire globe.

## **WWW (World Wide Web)**

Also known as the W3, or most often simply as the Web, it originally developed by CERN labs in Geneva, Switzerland. The World Wide Web Consortium oversees continuing development of the Web. The Web can be described (dryly) as a client/server hypertext system for retrieving information across the Internet. On the Web, everything is represented as hypertext (in HTML format) and is linked to other documents by their URLs. The Web encompasses its native http protocol, as well as ftp, Gopher, and Telnet. The best way to learn about it, however, is to try it for yourself.

## **Sources**

The CSPP Readiness Guide. <http://206.183.2.91/projects/readiness/glossary.htm>  
CNET Glossary. <http://www.cnet.com/Resources/Info/Glossary/>