

Preliminary Findings of E-Government Survey

- **Tier One Counties and Municipalities**
- **Tier Two Counties and Municipalities**
- **Tier One and Two School Systems**
- **Tier One and Two Community Colleges**
- **NC Councils of Government**

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For additional information concerning information contained in this report, please contact Shannon Schelin at the School of Government.

Telephone: (919) 962-5438

Email: Schelin@iogmail.iog.unc.edu

This report is available online at:

The Center for Public Technology's Web site

www.cpt.unc.edu/publications.html

The Rural Internet Access Authority's Web site

www.e-nc.org

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SCHOOL OF GOVERNMENT

School of Government
CB#3330 Knapp Building,
The University of North Carolina at Chapel Hill,
Chapel Hill, NC 27599-3330

E-Government in Tier One and Two Counties of North Carolina

The e-government paradigm, which emphasizes coordinated network building, external collaboration, and customer services, is slowly replacing the traditional bureaucratic paradigm and its focus on standardization, hierarchy, departmentalization, and operational cost efficiency. All of possibilities and transformational aspects of information technology are now emerging in the public sector. This report offers an opportunity to assess the current preparedness of Tier 1 and 2 local government units and education units to engage, embrace, and channel the new opportunities offered by e-government.

Key Terms

Connectivity: the ability to link to the Internet

Information technology: the branch of technology devoted to study and application of data and its processing

Infrastructure: the physical components, such as physical and wireless transmission media and communication devices, used to connect computers and users

Interoperability: the ability of software and hardware on different machines from different vendors to share data

Hardware: physical equipment (computers, monitors, keyboards, etc.) as opposed to programs, procedures, rules, and associated documentation

Software: a set of computer programs, procedures, and associated documentation concerned with the operation of a data processing system

“E-government” is government use of information technology, particularly Web-based Internet applications, to enhance delivery of information and services to employees and agencies within government and to citizens and business partners. E-government focuses on centralization of public data and improvement of internal processes and communications.ⁱ As the twenty-first century advances, government’s overwhelming interest is to use “interoperable” technologies, technologies that allow various departments to share data across information systems or products without special effort on the part of staff. Traversing all types of computer operating systems and various departments’ databases has become increasingly necessary.ⁱⁱ The use of these “interoperable” technologies will support greater efficiency and effectiveness, and more citizen access. To implement interoperable technologies, governments must address issues related to connectivity, infrastructure, hardware, and software. This report describes the technologies, the personnel capacities, and the infrastructure currently in place in rural North Carolina to support e-government.

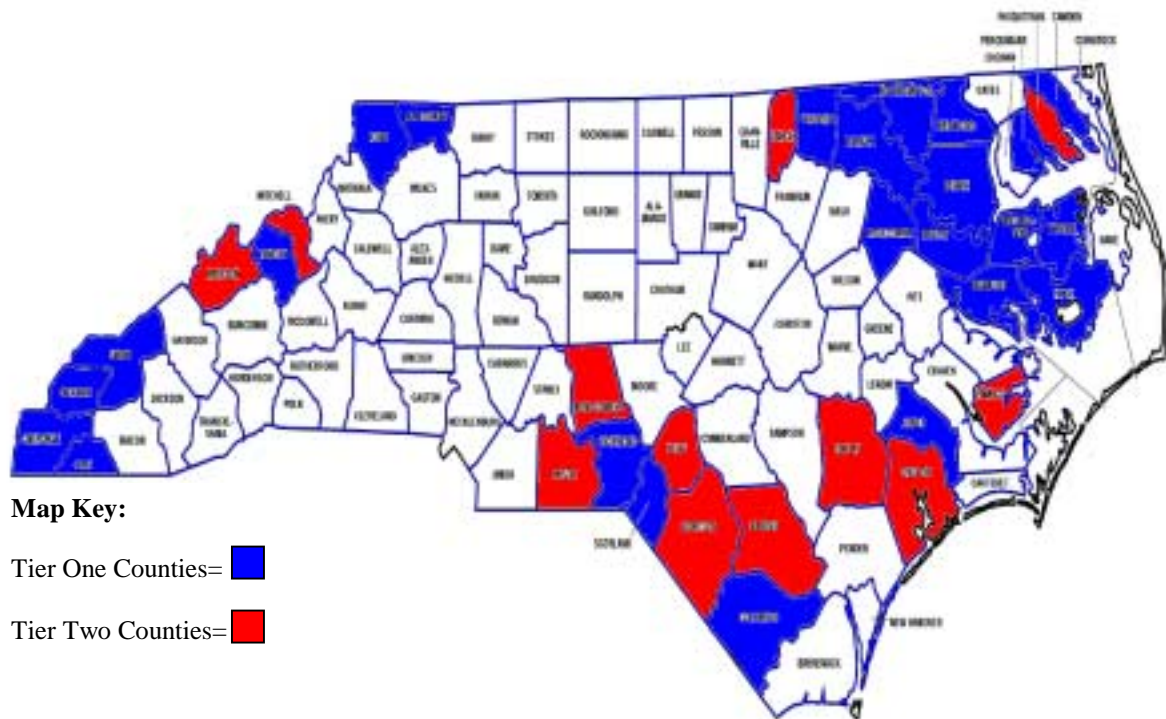
Background

In early 1997 the University of North Carolina's Institute of Government recognized a need to add information technology to its offerings to local governments in North Carolina. In early 2000, responding to government requests and following an in-depth analysis, it established the Center for Public Technology. The purpose of the Center is to respond to local governments' needs in information technology and to increase their skills and capacity in this area.

The North Carolina General Assembly also has recognized the importance of using information technology to enhance governmental interactions with citizens and businesses, as well as improve internal processes. In its 2000 session, it created the Rural Internet Access Authority to oversee efforts to provide rural areas with high-speed broadband Internet access.ⁱⁱⁱ The Rural Internet Access Authority is charged with eradicating the "digital divide" in North Carolina--that is, the gap between the people who have and the people who do not have affordable access to and the capability to use modern information technology. The Rural Internet Access Authority's main goals are to encourage the provision of local dial-up Internet access from every telephone exchange in North Carolina by August 2001, which has been achieved, and to encourage the provision of high-speed Internet access at competitive prices to all North Carolinians by December 2003.

In summer 2001 the Rural Internet Access Authority commissioned a survey by the Center for Public Technology of the state's Tier 1 and 2 counties, municipalities, councils of government, school systems, and community colleges.

The following map shows the tier designations of the counties.



Tier 1 and 2 counties are the most and the second-most economically distressed areas of the state, respectively, as ranked by the North Carolina Department of Commerce.^{iv} The purpose of the survey was to ascertain the infrastructure, the equipment, the personnel capacity, and the applications in place in rural North Carolina that might support e-government. The data gathered via the surveys are presented in this report.

The report is divided into two sections. The first section includes information about Tier 1 and 2 counties, municipalities, and councils of government. The second section includes information on Tier 1 and 2 school systems and community colleges.

Methodology

The survey inquired about the number of personal computers in use; the types of Internet connections in use; the percentage of employees with personal computers and Internet and e-mail access; the types of electronic transactions, networks, and software in use; and related technology issues. Several local government officials and industry experts reviewed the survey to ensure the validity of the questions. In June 2001 the survey was mailed to 321 units of government, including the 36 Tier 1 and 2 counties, the 169 Tier 1 and 2 municipalities, and 18 councils of government, as well as 18 Tier 1 and 2 North Carolina community colleges and 39 Tier 1 and 2 school systems. To encourage participation and to ensure the accuracy of the returned data, follow-up telephone calls were made to all the units. As of November 1, 2001, more than 84 percent had responded, including 89.3 percent of the municipalities, 80 percent of the counties, and 76.5 percent of the councils of government.

SECTION I:

Best Practices from the Field

❖ **Anson County**

❖ **Portal in a Box**

❖ **Smoky Mountain Knowledge Network**

❖ **Appalachian Access**

❖ **Telecommunications Strategies**

Best Practices

It is useful to set a framework to highlight the most creative governmental uses of technology. By focusing on the best practices found in the field of e-government, juxtaposed with data on the current status of Tier 1 and 2 areas of the state, it is easy to identify opportunities for technologically enabled improvement.

Anson County

Demand aggregation has emerged as an essential tool for enhancing buyer purchasing power. The objective is to provide individual government units with the best possible price by allowing them to combine their purchasing interests with those of other buyers. Buyers and sellers will thus be positioned to increase profitability through low-cost purchasing opportunities. This group buying system will ensure that buyers get a competitive price since the buyers will be treated as one single entity thus assuring government units of all sizes a level playing field. Anson County offers several best practices, including demand aggregation and resource sharing. The county has taken over several local municipalities' technology functions for purposes such as tax collection and billing. By providing these municipalities with technology services, Anson County not only most effectively maximizes their in-house hardware and software investments, the smaller governmental units are able to take advantage of these improved economies of scale.

Portal in a Box

There is a recent proliferation of ready-to-use county and municipal Web sites that are easily developed and supported and are hosted remotely at a reasonable fee. All a government needs is a PC with a connection to the Internet and they can have a presence on the Internet. The "Totally Web Government" program is a collaboration of National League of Cities, IBM Corporation and state municipal leagues. The "GovOffice WebCreator" is a collaboration of the International City/County Management Association, the League of Minnesota Cities, as well as

other state municipal leagues, and private sector partners, Avenet, AT&T and Microsoft Corporation. Both programs provide cities and towns with a "one-stop" evolving menu of e-government services and applications ranging from a user-friendly program to create a basic home page to a variety of interactive applications that will provide the capacity to respond electronically to citizen and business requests for information and services.

Totally Web Government and GovOffice WebCreator both provide styles, page templates, images, and text to get cities and towns started with building professional-looking Web sites with a minimum of training and effort. They each combine a low cost, easy to create and maintain Web site development capability with reliable and economical contract Web hosting.

The North Carolina League of Municipalities is sponsoring both programs to assist their members (especially smaller towns and cities) to make the best and most cost-effective use of powerful e-government technologies.

Smoky Mountain Knowledge Network and Appalachian Access

The 23-county western North Carolina region is an area of profound beauty and sublimity—with the terrain ranging from some of the highest mountains east of the Mississippi to deep, shaded gorges where trout-filled streams turn into rushing whitewater rivers. One of the most geographically isolated, and economically deprived areas in southern Appalachia, this area is surrounded on all sides by the 5,000-foot peaks of the Blue Ridge and Smoky Mountains. However, while this region boasts some of the most breathtaking beauty to be found in the country, it paradoxically presents some of the most perplexing and challenging problems to the people who live here.

In our region, a sharp decline in manufacturing, serious challenges to burley tobacco production, turbulent markets based on seasonal tourism, high illiteracy rates, below-average

wages and above-average housing costs, the out-migration of talent, and a fragile physical environment threaten the vitality—if not survival—of the region. Economic diversification and market expansion are the keys to the long-term survival of our communities.

Coupled with these challenges is the simultaneous emergence of a new economy that is powered by 21st Century technologies and knowledge resources. This new economic order presents a wealth of opportunity for those who have access to these resources—increased economic opportunities, higher living standards, better schools, stronger communities, and more meaningful participation in government and public life—and a widening gap for those who do not. At the center of the New Economy is a powerful “engine” which prefers the high-octane gas of e-business. The great thing about e-business is that it knows no boundaries—it is not geographically confined—it literally erases the distance that rural areas have from markets and centers of economic activity. Those communities that have the infrastructure and the workforce poised to take advantage of this high-powered engine will win the race.

By all accounts, to create a new economic reality for itself, rural western North Carolina’s existing and prospective businesses, emergent IT professionals, artisans and farmers, health care providers, government and public agencies, educational institutions, marginalized groups, and non-profit organizations—respectively—must have:

ESSENTIAL ELEMENTS:

- | | | |
|-----------------------|--------|--|
| Poised Infrastructure | ➔ | 1) High-performance broadband telecommunications infrastructure with connectivity at affordable prices and broad-based public and private sector access to technology resources; |
| Poised Workforce | ➔ | 2) Community-based digital literacy campaigns as well as seamless, comprehensive training and re-training opportunities; |
| Poised Market | ↗
↘ | 3) A process for identifying, engaging, readying, and supporting the local workforce and businesses to transition to—as well as perform and compete in—a global marketplace; and |
| | | 4) Innovative approaches to business market expansion to a more diversified and robust national and global platform. |

A Bold Plan for the Future

Armed with the collective thoughts of some of the best thinkers in the state and nation, these four critical ingredients are being addressed holistically through an innovative grassroots partnership called the Western North Carolina Knowledge Coalition (WNCKC). In 1998, the 100+ leaders who comprised the WNCKC in the 23 western-most counties recognized that preparing the region to participate in the 21st Century economy would become the principal foundation for renewing our economic vitality and began to take action.

In 1999, Southwestern Community College, a member of the WNCKC, formed an affiliated collaborative called the Smoky Mountain Knowledge Network (SMKN). This broad-based coalition (encompassing Jackson, Macon and Swain Counties and the Eastern Band of the Cherokee Indians) is focused on developing and moving forward with an integrated community development strategy that incorporates all of

the essential elements enumerated above. The end goal is to create a sustainable “engine” capable of harnessing many of the same cultural and economic benefits enjoyed by our urban sister communities without sacrificing our quality of life.

In developing the conceptual framework for SMKN, the College and its partners realized that all individuals and organizations seeking to participate in this new economy must be connected—essential element #1. Unfortunately, extremely high connectivity costs and limited service availability were putting western North Carolina's rural areas at a tremendous

A Direct Response to...

- NC Rural Prosperity Task Force
- Vision 2030
- NC Progress Board
- Advantage West's Blue Ribbon Commission
- US Department of Commerce's "*Falling Through the Net*"
- NC Rural Internet Access Authority

Key Players and Funders:

Appalachian Regional Commission
WNC Knowledge Coalition
Education and Research Consortium
Southwestern Community College
The Institute at Biltmore
Advantage West
NC Rural Center
US Department of Commerce
Library of Congress
US Department of Education
City of Asheville
County of Buncombe
University of North Carolina—Asheville
Z. Smith Reynolds Foundation
Janirve Foundation
Region A Council of Government
Land of Sky Regional Council

disadvantage. We discovered that the fundamental issue for service providers is aggregate demand. It is simply more profitable to target high-end customers in the most densely populated areas where demand is the greatest and the infrastructure requirements are most concentrated. In urban areas, the presence of major research universities, world-class medical centers, and high-tech industries has attracted remarkable economic activity and growth. We determined that our rural region would not be able to compete for connectivity unless we find ways to leverage our buying power and create that demand. We have formally organized our efforts at leveraging this buying power under an initiative we call Appalachian Access.

The purpose of this initiative is to lower the cost of access to and increase availability of high-speed telecommunications services in rural western North Carolina. To accomplish this, we are closely identifying all of the properties of telecommunications demand for public and private users (Internet, wireless, long distance, local service, etc) to build an attractive business case to catalyze this to happen. Users will then have the opportunity to take advantage of the lower costs via a regional non-profit membership cooperative or volume-purchasing consortium. As more and more users are added, the price for services will be driven down—as much as 40 percent or more.

College partners and community leaders also knew that for our region to do well, connectivity is not the only issue. People, companies and communities also need support and value-added services, application opportunities to leverage the connectivity—education and training, market and business development, etc.—thereby addressing essential elements # 2, #3, and #4. We believe that this is the beauty of the Smoky Mountain Knowledge Network effort: it intertwines the issues of connectivity (access to bandwidth) with issues of applications (what to do with the connectivity once you get it). The SMKN initiative will utilize Appalachian Access's telecommunications connectivity to provide a mechanism to eliminate the high costs of individual organizations each buying technology applications (like Internet service, e-commerce

applications, Web development, etc.) and each initiating their own stand-alone training and reform initiatives. SMKN will essentially function as an Applications Service Provider that bundles a variety of specialty applications on behalf of a group of users. Using 21st century technologies to deliver an integrated menu of voice, data, video services, SMKN partners will browse the connectivity and applications menu, making independent decisions about the degree to which they will plug-in to the open architecture of the network and draw down services. Network partners will share technical support which none could justify nor afford on their own and they can export courseware and other application deliverables worldwide.

A region must do all of this simultaneously—abandoning the “cart-before-the-horse” mentality—resulting in a unified poised infrastructure, workforce and market.

Telecommunications Best Practices

Use of Tower Assets

The Town of Tryon in Polk County owns a telecommunications tower on Tryon Peak, a nearby mountaintop. The Polk County Library and the Polk campus of Isothermal Community College were starved for affordable bandwidth. The college and the library, in conjunction with the nonprofit Mountain Area Information Network (MAIN), approached the Town of Tryon about placing a small wireless antenna on the town tower.

Using the antenna on Tryon Peak, the college and MAIN were able to lease an expensive T-1 circuit to the Internet and to bounce a portion of that bandwidth off the antenna and down to the library for its public-access computers and staff LAN (local area network). The college, the library and MAIN split the cost of the T-1 circuit three ways, thereby making the high-speed bandwidth affordable for all parties. In return for use of its tower, the Town of Tryon gets a free high-speed wireless link to the Internet. The wireless operation is managed by NewEra.Com, an Asheville-based wireless firm, which is now offering broadband commercial services in Polk County.

Link: <http://www.shorecliffcommunications.com/magazine/volume.asp?Vol=21&story=197>

Use of Cable Franchise Assets

The cable franchise grants a cable company the use of public right of ways. This franchise is an effective monopoly and yields a very high return on investment for the cable company. (The monopoly is effective because only in large metropolitan areas will cable companies compete with each other.)

Federal law allows the franchise to be used to leverage the value of public right of ways to bring free cable-modem Internet access to local schools, libraries and community centers. These agencies can save thousands of dollars in Internet-access fees.

Similarly, federal law allows local governments to use the cable franchise to negotiate the installation of an Institutional Network (I-NET) by the cable company. This network, which can connect government buildings, libraries, schools, community centers, etc, can also be used to save thousands of dollars annually in telecommunications fees.

Another cable franchise strategy among rural communities is the creation of a regional partnership to negotiate cable franchise renewals and to coordinate telecommunications services. One of the most developed of these collaborative efforts is in the Beaverton, Oregon area, where the Metropolitan Area Communications Commission has been able to improve the region's telecommunications services while saving thousands of dollars in local government telecom costs.

Links:

<http://www.maccor.org>

<http://www.natoa.org>

<http://www.mwg.org/epub/cyber/strat.htm>

Each of these best practices offers a unique opportunity for local governments and education units to partner with other community members to further explore the opportunities and advantages offered by information technologies.

SECTION II:

Tier One and Two Local Government Units

❖ **Counties**

❖ **Municipalities**

❖ **Councils of Government**

Highlights of the Findings

Several major themes emerged from the survey data:

- ❖ Municipalities in Tier 1 and 2 counties are much more limited in infrastructure, hardware, software, and personnel capacity for information technology than are the counties in which they are located.
- ❖ The lack of internal and external information technology networks in Tier 1 and 2 municipalities and counties indicates a lack of sufficient infrastructure to support interoperable e-government initiatives.
- ❖ Tier 1 and 2 municipalities' connection to the Internet, if they have one, is primarily via a slow-speed, dial-up modem.

Each of these themes is reflected in the discussion of the issues that follows. Additionally, Appendix A is a matrix that illustrates the median values of the various issues by governmental unit.

Population Size and Technological Sophistication

The survey data suggest that population size is an indicator of how much infrastructure, equipment, and applications each government unit has. In essence, the smaller a government unit's population, the less technology infrastructure, equipment, and applications the unit has. More than 50 percent of the Tier 1 and 2 counties have populations of less than 28,000. More than 60 percent of the Tier 1 and 2 municipalities have populations of less than 1,000.

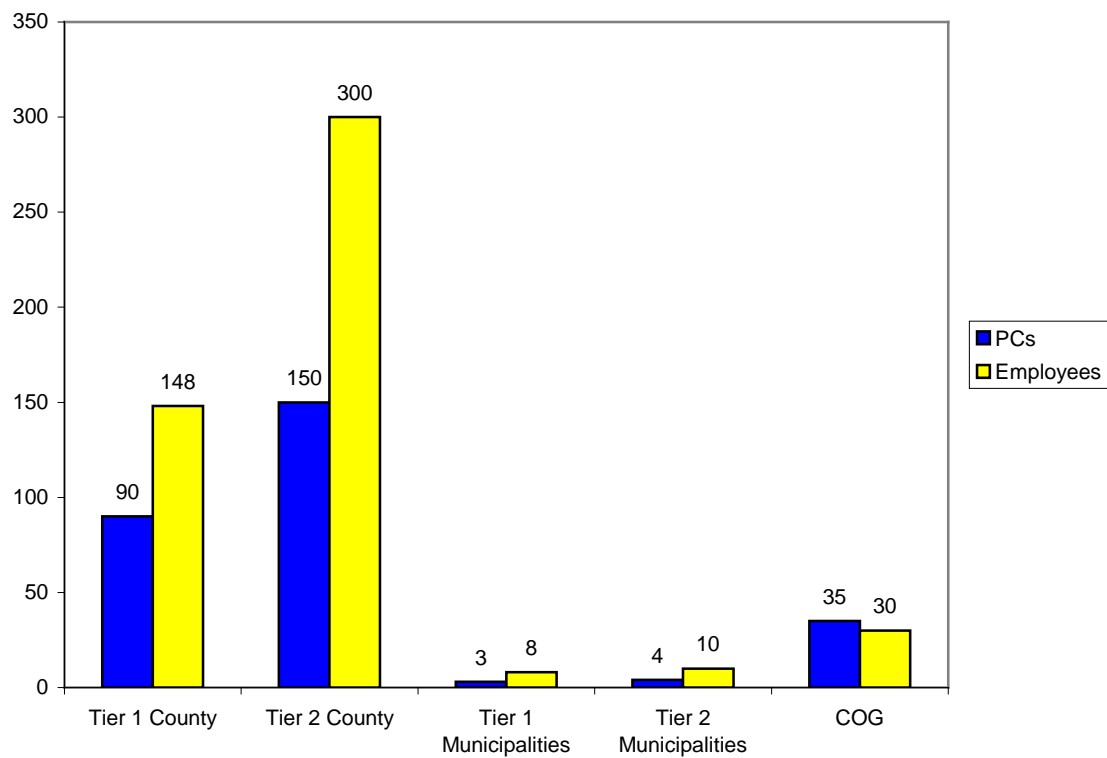
The correlation between population size and information technology is pronounced for municipalities. It is not as strong for counties, in part because they administer state and federal programs and are allocated state-sponsored systems in which the hardware and software are provided or subsidized to administer the programs.

Number of Personal Computers

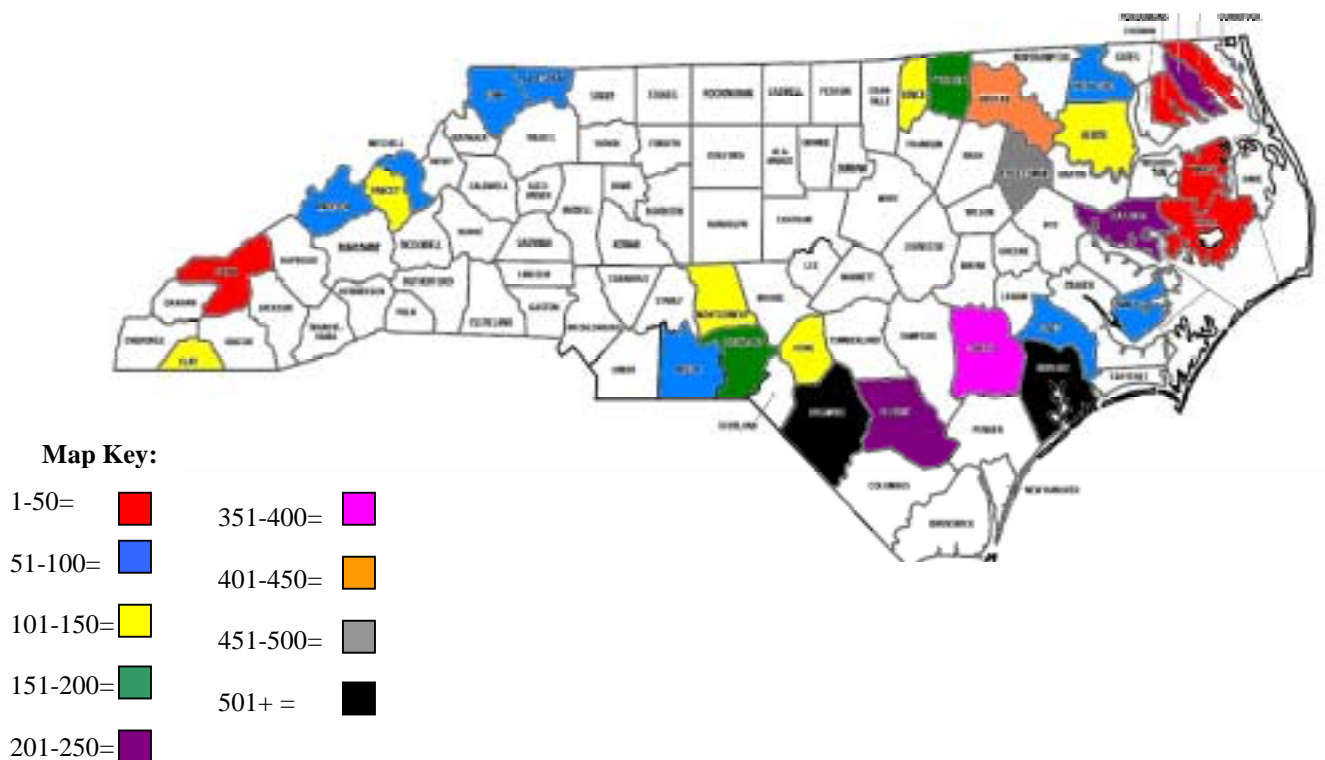
Personal computers are indispensable for access to the Internet and other technologies. However, for many units of government in economically distressed areas, such hardware is limited (see Figure 1). The following ratios of personal computers to personnel are primarily a tool to gauge the level of technology penetration. The use of the ratio does not imply that there needs to be a one to one (1:1) relationship between personal computers and employees. For example, the field-based operations of a government unit, such as solid waste collection, or multi-shift operations, such as the fire department, do not need one personal computer for every employee assigned to the unit. However, the ratio does provide an easily understandable method for presenting the data that still maintains the integrity of the data. Finally, it is important to note that this data does not assess the capabilities of the personal computers in the governmental unit. It merely compares the number of governmental personal computers to the number of governmental employees.

On average, in Tier 1 and 2 municipalities, there is one computer for every 2.6 employees. Moreover, 22 of the Tier 1 and 2 municipalities have no personal computers at all. Tier 1 and 2 counties and councils of government fare somewhat better, although some still lack enough personal computers for all their employees. Tier 1 and 2 counties average one computer for every 1.9 employees. In contrast, the average council of government has 1.2 personal computers for every employee.

Figure 1: Employee to PC Ratios



Map of Number of Personal Computers in County Governments



Employee Access to Personal Computers, E-Mail, and the Internet

Employee access to personal computers, e-mail, and the Internet is another critical issue as local governments attempt to advance into the Technology Age. Ninety percent of Tier 1 municipalities and 85 percent of Tier 2 municipalities report some access to personal computers for employees, but less than 60 percent of either type reports some access to e-mail or the Internet. All Tier 1 and 2 counties and councils of government report some access to personal computers, e-mail, or the Internet for employees. Employees of councils of government have greater access to these communication channels than employees of municipalities and counties do, with all reporting entities having at least 50 percent employee access to personal computers, e-mail, and the Internet. (For the number of units in which at least 50 percent of employees have access, see Table 1.)

Table 1: Employee Access to PCs, E-mail, and the Internet

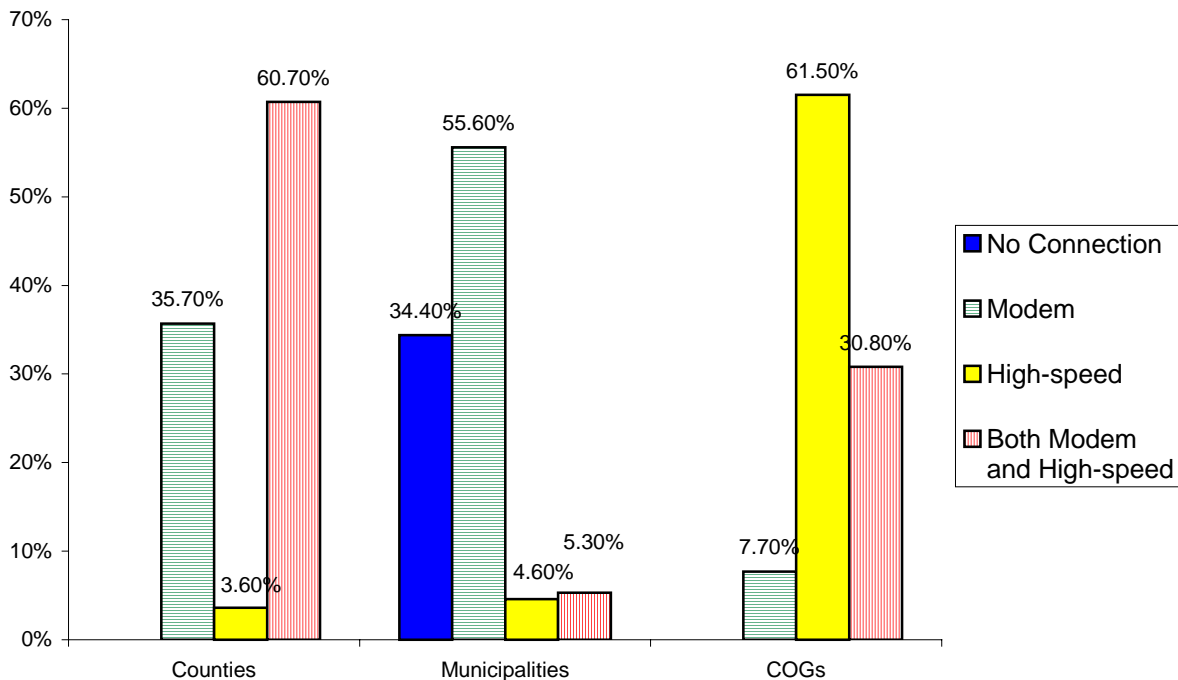
Unit of Government	Number of units with 50% or greater employee access to PCs	Number of units with 50% or greater employee access to e-mail	Number of units with 50% or greater employee access to Internet
Reporting Counties (Tier One and Two)	25 of 26	16 of 26	18 of 26
Reporting Municipalities (Tier One and Two)	104 of 150	56 of 149	55 of 148
Reporting COGs	13 of 13	13 of 13	13 of 13

Connection to the Internet

As noted earlier, one of the primary goals of the Rural Internet Access Authority is to provide high-speed Internet connections to all North Carolinians by 2003. The value of a high-speed connection versus a standard dial-up connection is the rate of information transfer. The response time is essential because the more quickly applications can be delivered and processed, the more they are used, and the more efficient they become. As more Web applications become available, the rate of data transfer will become increasingly important.

The survey results indicate a clear disparity between municipalities and other government units in connectivity methods (see Figure 2). About 34 percent of Tier 1 and 2 municipalities have no Internet connection at all. Among those that do have a connection, nearly 56 percent rely on slower, dial-up methods. In contrast, 63 percent of Tier 1 and 2 counties connect to the Internet via both modem and high-speed methods, meaning the unit has both capabilities, and nearly 62 percent of councils of government use high-speed methods.

Figure 2: Types of Internet Connections Used by Government Units

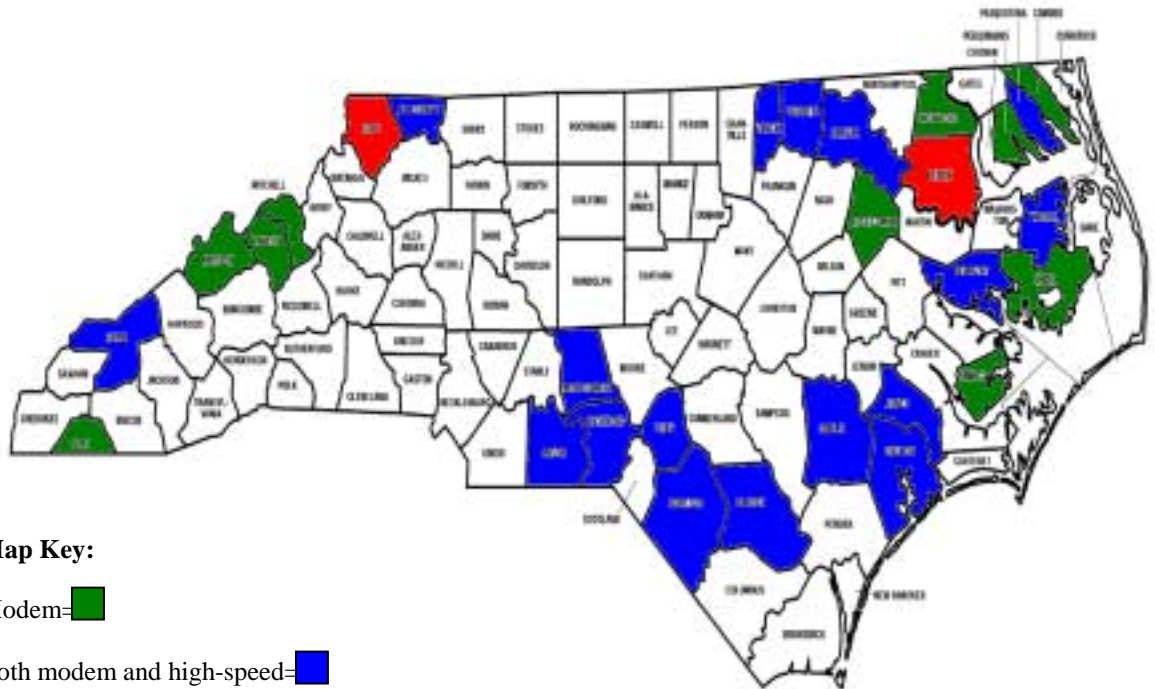


With regard to Internet connection, there is an inherent liability of smallness association. The larger the population of a jurisdiction, the greater is the demand for the infrastructure necessary to support modern information technology. Therefore the larger the population, the more likely it is that private companies, such as Internet service providers and cable companies, will establish the necessary infrastructure, including cable, dark fiber, and high-speed telephone lines, for high-speed Internet connections. The survey shows a moderate correlation between population size and the type of Internet connection a county has in place. There is a much stronger correlation between population size and a municipality's type of Internet connection. In essence, the smaller a municipality, the less technologically advanced its type of Internet connection.

However, by utilizing the data collected in the survey, new methods for achieving high-speed Internet access can begin to emerge. For example, demand aggregation becomes essential with regard to improving the Internet connection capabilities of local government units. By bundling several local governments' need for high-speed Internet connection, the market value of the demand increases.

The following maps illustrate the predominant type of Internet connection in the counties and municipalities.

Map of Internet Connection in Counties



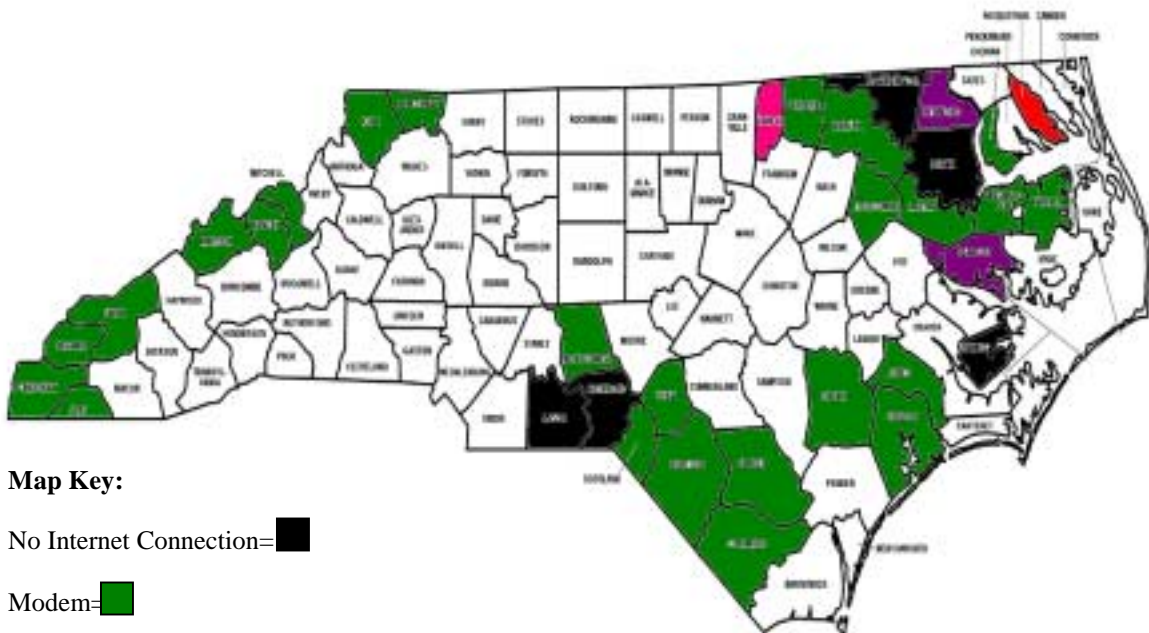
Map Key:

Modem= ■

Both modem and high-speed= ■

High-speed= ■

Map of Average Internet Connection of Municipalities in Each County



Map Key:

No Internet Connection= ■

Modem= ■

Combination of No Connection and Modem= ■

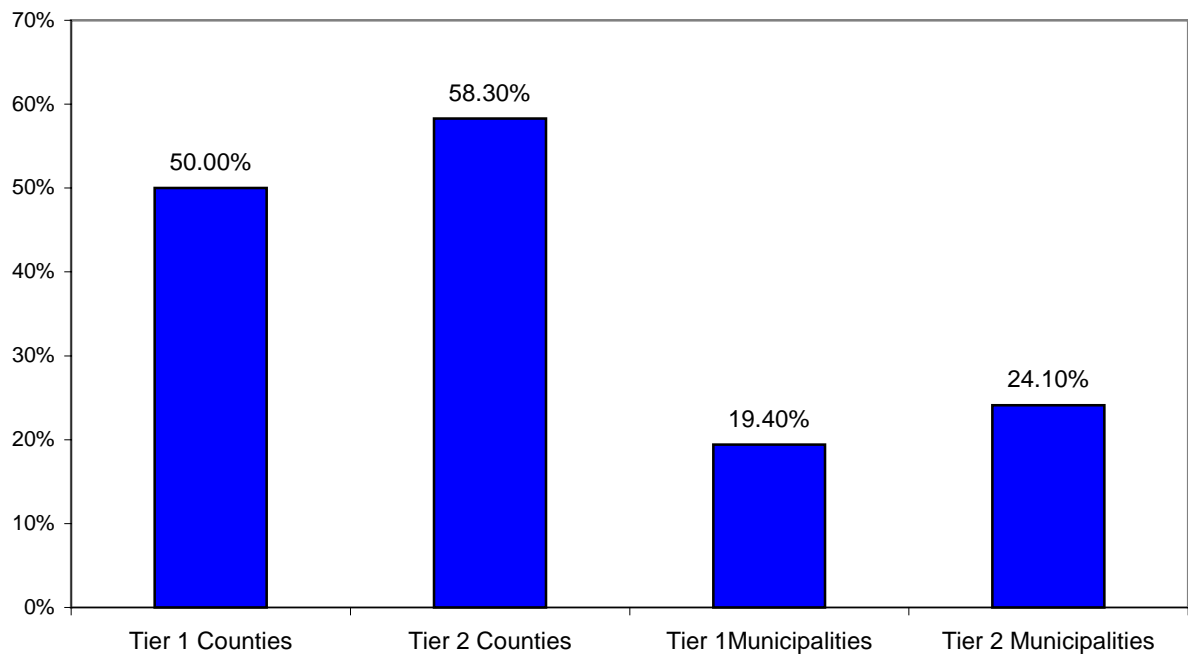
Combination of No Connection and High-speed= ■

High-speed Connection= ■

Official Web Sites

Current literature indicates that government Web sites are necessary to encourage civic participation and to allow citizens access to government service twenty-four hours a day, seven days a week. A recent national survey found that more than 80 percent of local governments had Web sites.^v North Carolina's Tier 1 and 2 counties and municipalities are well behind this national average; 53 percent of Tier 1 and 2 counties have Web sites and 21 percent of Tier 1 and 2 municipalities have Web sites (see Figure 3). All the councils of government in these tiers have Web sites.

Figure 3: Percentage of Reporting Counties and Municipalities with Official Web Sites



Web Site Usage

The majority of counties, municipalities, and councils of government use their Web sites for information dissemination only. Only 11.1 percent of all responding Tier 1 and 2 counties use their Web sites for information dissemination and transaction processing. Additionally, only 2.6 percent of all responding Tier 1 and 2 municipalities use their Web sites for information dissemination and transaction processing. The use of the official Web site for transaction processing and other forms of citizen engagement is one of the central components of e-government.

Electronic Transactions

Electronic transactions are another attribute of e-government, as well as effective means for increasing citizen access to government services. In Tier 1 and 2 counties and municipalities, the overwhelming majority do not have plans for implementing electronic transactions. The one notable exception is GIS (geographic information systems), which 48 percent of the reporting counties either have in place or are in the planning stages of implementing. Additionally, the councils of government use GIS extensively, with 38.5 percent having the system in house.

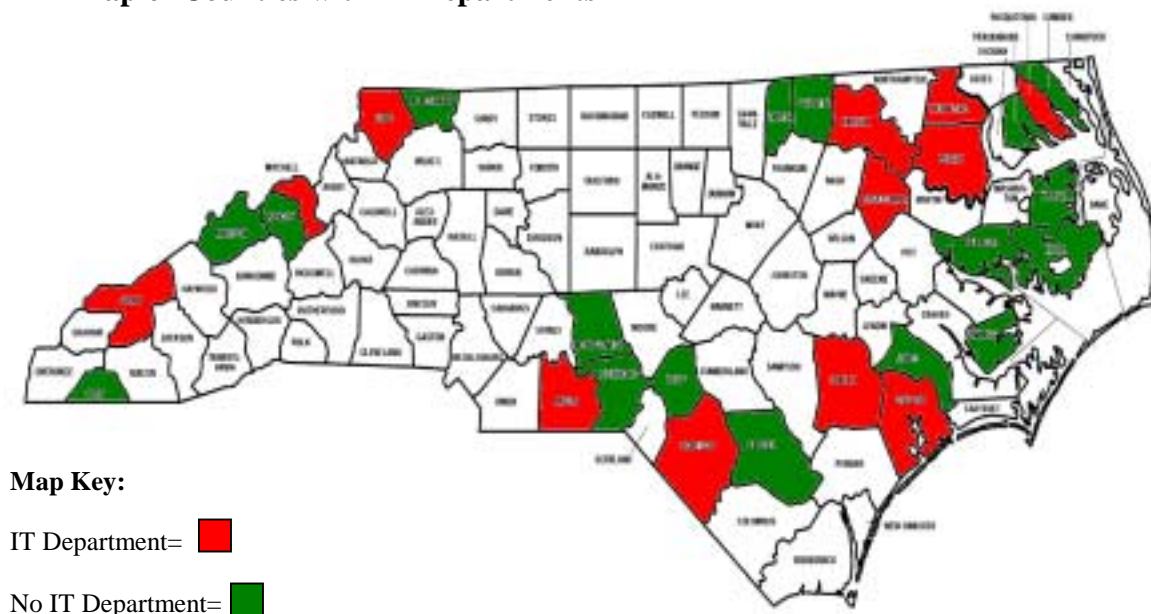
Information Technology Departments

The lack of information technology departments—or, more accurately, a lack of IT staff—in Tier 1 and 2 government units is another obstacle to development and implementation of e-government initiatives. Information technology departments provide the knowledge base and the technical support to implement and maintain technology systems on a daily basis. Without dedicated information technology departments or at least trained information technology personnel, local governments will have difficulty moving forward into the era of e-government.

Ninety-six percent of Tier 1 and 93 percent of Tier 2 municipalities do not have an information technology department. Seventy-five percent of Tier 1 counties and 50 percent of Tier 2 counties do not have such a department. Furthermore, 69 percent of the councils of government lack this kind of support. Although not all organizations need a fully dedicated information technology department, all do need at least one person trained to handle the information technology issues that will inevitably arise.

The following map indicates the presence of IT departments in the counties. No map of Tier 1 and 2 municipalities is presented because no county has a majority of municipalities with dedicated IT departments. Primarily, the only municipalities with IT departments are those that are county seats, and even then, not all county seats have IT departments.

Map of Counties with IT Departments



Equipment

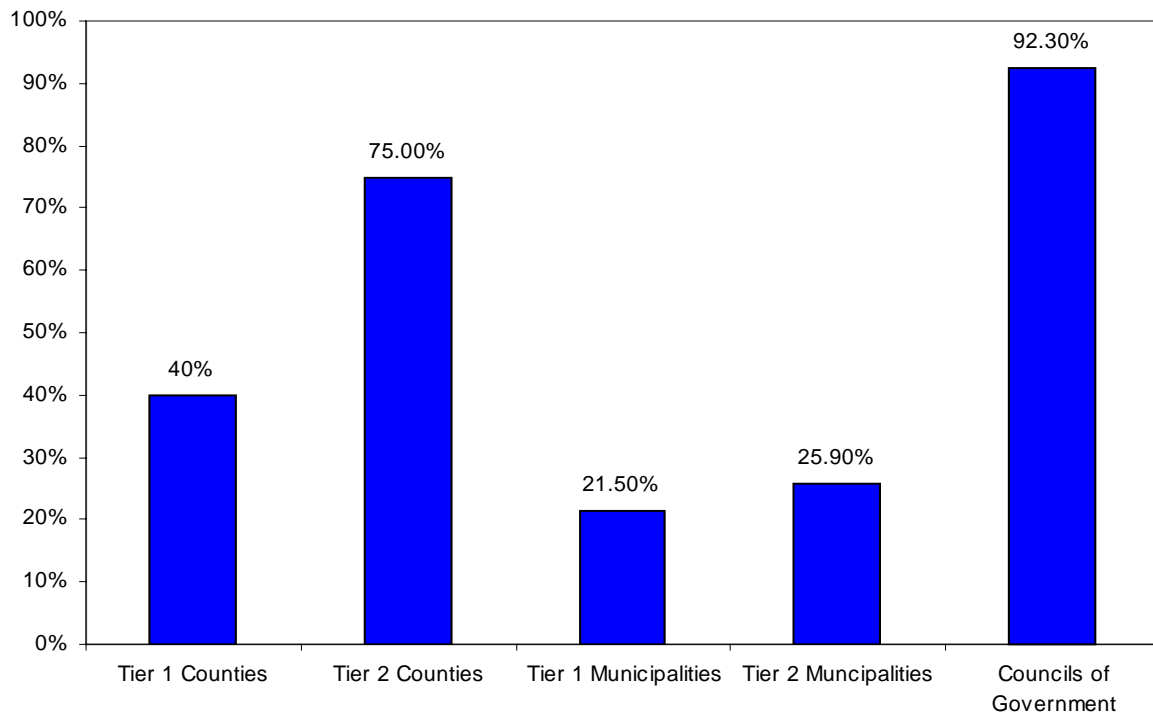
The type of equipment found in local government units varies greatly. Eighty-two percent of reporting Tier 1 and 2 counties have laptops, whereas only 33 percent of municipalities do. All of the reporting councils of government have laptops. Over 78 percent of counties have optical scanners, compared to 24.5 percent of municipalities. Over 92 percent of Tier 1 and 2 counties have digital cameras versus only 24.5 percent of Tier 1 and 2 municipalities. Finally, 89 percent of reporting counties and 33 percent of reporting municipalities have uninterruptible power supplies.

Networks

The value of interoperability and connectivity through networks is immeasurable. Networks enable the sharing of applications and data across departments, and they save money by streamlining applications and reducing data redundancy. For example, Joe Smith has lived in a town all his life but has moved three times within the town limits. The planning department, the fire department, and the tax department may have different addresses for him. With interoperable, connected systems, Joe could register his change of address with one department, and the information could be transferred to all other departments. This capability would not only lessen the burden on Joe but also reduce the workload of town staff in changing Joe's address in all the various departmental systems. Although an application enables the transfer of Joe Smith's data, a network is instrumental in allowing the various departments to share the application and communicate with one another.

Among reporting Tier 1 and 2 units, 52 percent of counties and 23 percent of municipalities currently have networks (see Figure 4). In contrast, 83 percent of councils of government have them.

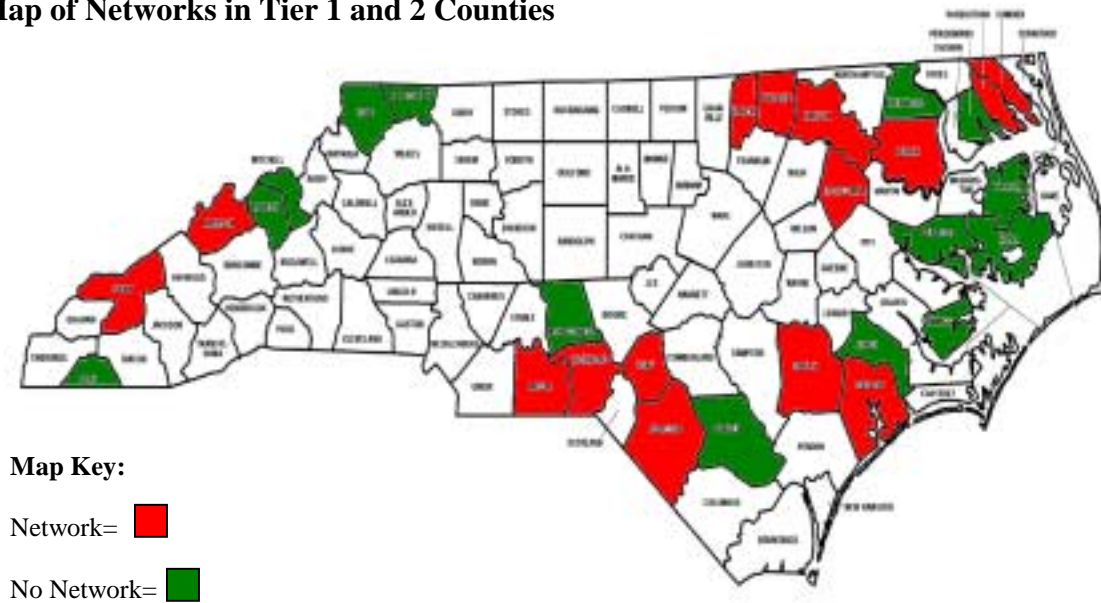
Figure 4: Percentage of Government Units with Networks



Forty percent of Tier 1 counties have local area networks (LANs), as do 75 percent of Tier 2 counties. Twenty percent of Tier 1 municipalities and 24 percent of Tier 2 municipalities have LANs. Over 92 percent of the councils of government have LANs.

The following map indicates the presence of a network in the county. No map of the Tier 1 and 2 municipalities is presented because no majority of municipalities in a given county have networks in place.

Map of Networks in Tier 1 and 2 Counties



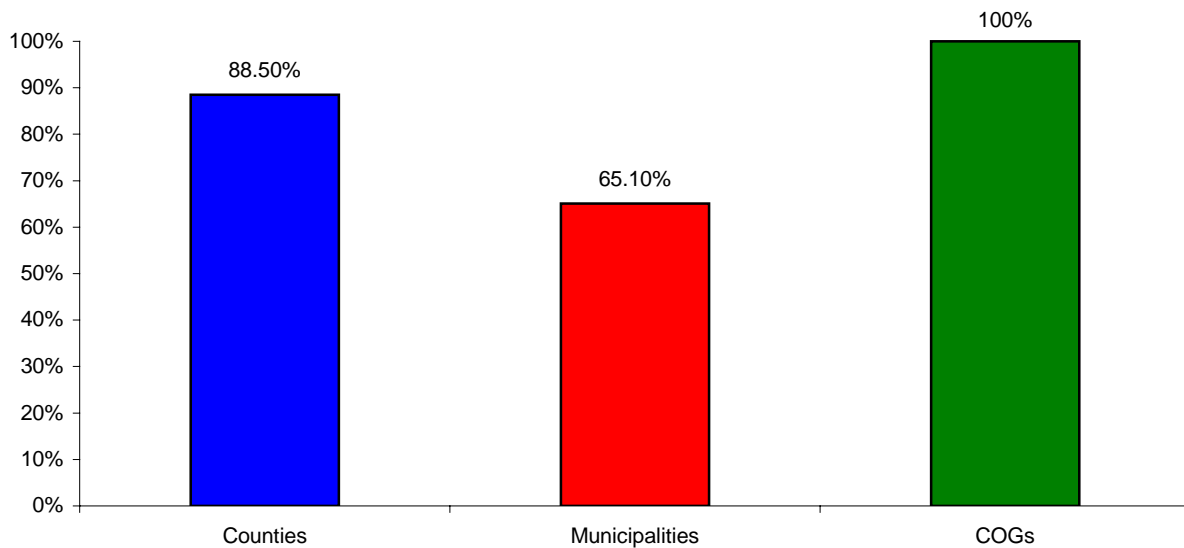
Servers

Several types of servers are found in the various local government units surveyed. In the Tier 1 and 2 counties, the most common servers are database and file servers, with 40 percent of the reporting counties having one of the two aforementioned servers. The reporting Tier 1 and 2 municipalities have very few servers. The most common server found in the municipalities is the e-mail server, with 8.7 percent of the reporting units indicating its presence in the locations. The councils of government primarily use Web servers and e-mail servers, with 69.2 percent and 61.5 percent reporting, respectively.

Software

The popularity of Microsoft Office as the primary software suite is evident in all of the surveyed local government units. The use of Microsoft Office in each of the respective units of government is indicated in Figure 5.

Figure 5. Percentage of Reporting Local Government Units Using MS Office



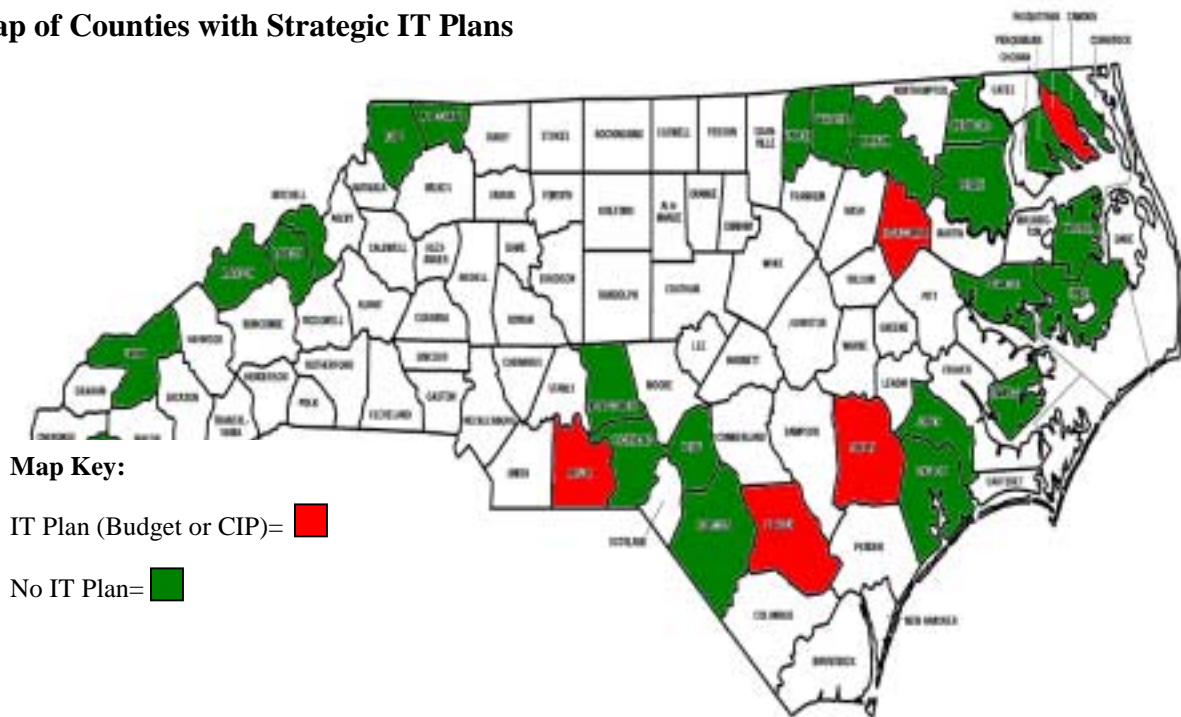
The most popular software used for accounting in Tier 1 and 2 counties is Munis, whereas CitiPak is the accounting software of choice for Tier 1 and 2 municipalities. The most popular e-mail software for the reporting counties, municipalities, and councils of government is Microsoft Outlook. In terms of mapping and GIS software, the ESRI products, including ArcView and ArcInfo, are the most popular across all local government units.

State Contract and Procurement

The lack of commitment to using the state contract for IT purchases among the local government units is concerning. Only 44 percent of Tier 1 and 2 counties and 19 percent of municipalities report using the state contract for technology purchases. Forty-one percent of the councils of government use the state contract. However, over 85 percent of reporting counties and 50 percent of reporting municipalities competitively bid their IT contracts.

Another important consideration in planning and implementing information technology in local government is strategic planning. The following map indicates which counties have either IT plans tied to their budgets or IT plans tied to their capital improvement plans. Again, no map of the municipalities is presented due to the lack of strategic technology plans in place at the municipal level.

Map of Counties with Strategic IT Plans



Finally, there is a lack of cost/benefit or total cost of ownership analysis performed at all levels of local government. Seven percent of Tier 1 and 2 counties, 6.5 percent of Tier 1 and 2 municipalities, and none of the reporting councils of government have a process to justify technology investments and expenditures.

Biggest Hindrances to Pursuing E-Government

All the types of government units surveyed rank funding as the biggest hindrance to implementing e-government initiatives. The second biggest hindrance for Tier 1 municipalities is implementation and maintenance issues, which involve both establishment of new technologies and the upkeep required to keep systems functioning at optimal levels. For Tier 2 municipalities and for councils of government, training is the second largest hindrance; for Tier 1 and 2 counties, it is lack of infrastructure.

SECTION III:

Educational Units

❖ **School Systems**

❖ **Community Colleges**

Highlights of the Findings

Several major themes emerged from the survey data:

- ❖ All reporting school systems and community colleges have Web sites.
- ❖ Tier 1 and 2 school systems and community colleges' connection to the Internet is primarily via high-speed methods or a combination of high-speed and modem.
- ❖ It is important to note that the data on the school systems does not reflect the situation at each individual school within the system.
- ❖ Another important note is that the Internet connection data does not imply that all classrooms have Internet access; it simply pertains to the existence of Internet access in the school system.
- ❖ Finally, the amount of technological capacity found in the school systems and community colleges is by no means sufficient for the significant demands these units face; however, it does offer a well-grounded starting point for collaborative work with local government units to increase the understanding and usage of e-government.

Each of these themes is reflected in the discussion of the issues that follows. Additionally, Appendix B is a matrix that illustrates the median values of the various issues by education unit.

Number of Personal Computers

Personal computers are indispensable for access to the Internet and other technologies. The Tier 1 and 2 school systems have, on average, 881 personal computers in their locations. The median number of administrative personal computers in the school systems is 132. This number does not include personal computers in classrooms that teachers use for administrative and instructional purposes. The median number of total personal computers in Tier 1 and 2 community colleges is 510.

Employee Access to Personal Computers, E-Mail, and the Internet

Employee access to personal computers, e-mail, and the Internet is another critical issue for customer service and the transition to the e-environment. Over 97 percent of reporting Tier 1 and 2 school systems at least 75 percent employee access to personal computers, e-mail, and the Internet. One hundred percent of reporting Tier 1 and 2 community colleges report 75 percent access to personal computers, e-mail, or the Internet for employees. The number of educational units with 100 percent employee access to personal computers, e-mail, and the Internet is illustrated in Table 2.

Table 2: Employee Access to PCs, E-mail, and the Internet

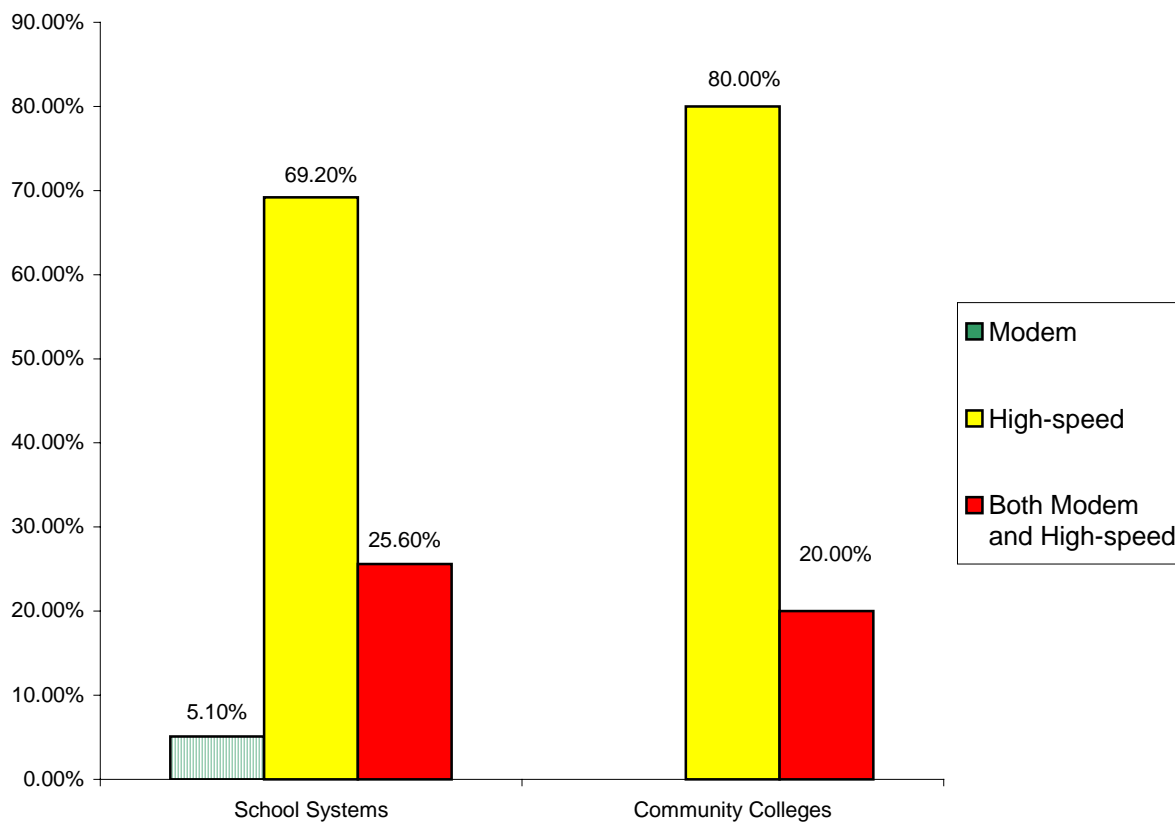
Unit of Government	Number of units with 50% or greater employee access to PCs	Number of units with 50% or greater employee access to e-mail	Number of units with 50% or greater employee access to Internet
Reporting School Systems (Tier 1 and 2)	35 of 39	38 of 39	38 of 39
Reporting Community Colleges (Tier 1 and 2)	12 of 15	11 of 15	12 of 15

Connection to the Internet

As noted earlier, one of the primary goals of the Rural Internet Access Authority is to provide high-speed Internet connections to all North Carolinians by 2003. The value of a high-speed connection versus a standard dial-up connection is the rate of information transfer. The more quickly applications can be delivered and processed, the more they are used, and the more efficient they become. As more Web applications become available, the rate of data transfer will become increasingly important.

The survey results indicate that educational units have fairly sophisticated Internet access. However, it is important to note that the school system data are not representative of each individual school within the system. Additionally, the data do not indicate that all classrooms have Internet access. The data only refer to the Internet access of the school system as a whole. Sixty-nine percent of the Tier 1 and 2 school systems have high-speed Internet access, while 25 percent have both modem and high-speed access (see Figure 6). Only five percent of the school systems report having only modem access to the Internet. Eighty percent of reporting Tier 1 and 2 community colleges have high-speed access, and the remaining twenty percent have both modem and high-speed methods (see Figure 6).

Figure 6: Types of Internet Connections Used by Education Units



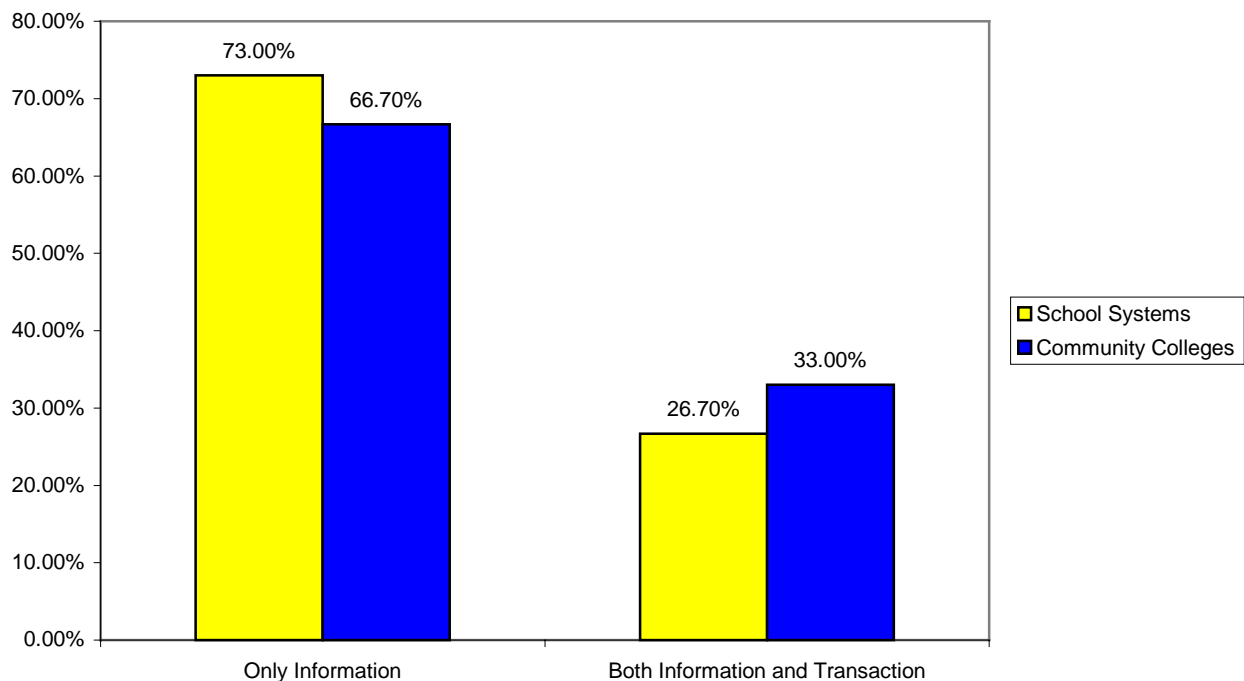
Official Web Sites

Current literature indicates that Web sites are necessary to encourage customer and citizen participation and to allow 24/7 access to services. The education units in Tier 1 and 2 counties are leading the way, with **100 percent** of reporting school systems and community colleges having Web sites.

Web Site Usage

The majority of Tier 1 and 2 school systems and community colleges use their Web sites for information dissemination only. However, over 26 percent of responding school systems and 33 percent of community colleges use their Web sites for both information dissemination and transaction processing (see Figure 7).

Figure 7. Web Site Capacity



The use of the official Web site for transaction processing and other forms of citizen/customer engagement is one of the key components of the e-environment.

Information Technology Departments

The existence of information technology departments in the majority of educational units is another indication of the strong capacity of the units. However, it is important to note that many of these IT departments are understaffed and underfunded, according to officials at the North Carolina Department of Public Instruction and the North Carolina Community College System. The existence of an IT department does not imply that the educational units have sufficient personnel and capabilities to handle all of the complexities associated with supporting technology. Without adequate dedicated information technology departments or at least trained information technology personnel, the Tier 1 and 2 school systems and community colleges will have difficulty moving forward in the digital age.

Eighty-four percent of reporting Tier 1 and 2 school systems have an information technology department. However, the median number of employees in the school system IT departments is three. Ninety-three percent of reporting Tier 1 and 2 community colleges have IT departments, with the median number of employees being three.

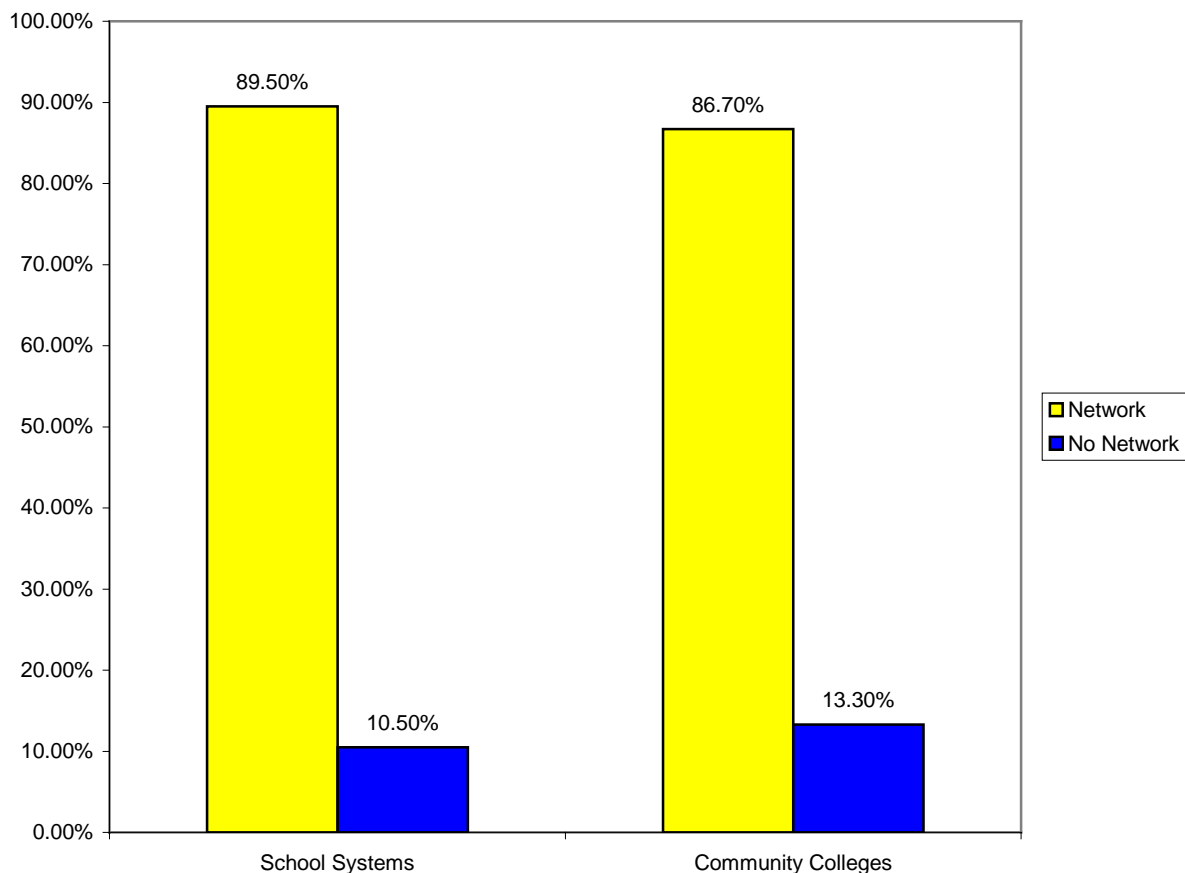
Equipment

The type of equipment found in educational units varies greatly. One hundred percent of reporting Tier 1 and 2 school systems and community colleges have laptops. Over 93 percent of the school systems and community colleges have optical scanners. One hundred percent of Tier 1 and 2 school systems have digital cameras, as do 93 percent of reporting community colleges. Finally, 65 percent of reporting Tier 1 and 2 school systems have uninterruptible power supplies, compared with 100 percent of community colleges.

Networks

As mentioned above, the value of interoperability and connectivity through networks is immeasurable. Networks enable the sharing of applications and data across departments, and they save money by streamlining applications and reducing data redundancy. Again, the Tier 1 and 2 school systems and community colleges are leading the e-revolution in terms of networks. Almost 90 percent of Tier 1 and 2 school systems and 87 percent of community colleges have networks in the organization (see Figure 8). Seventy-nine percent of the school systems have local area networks (LANs), as do 86 percent of the community colleges.

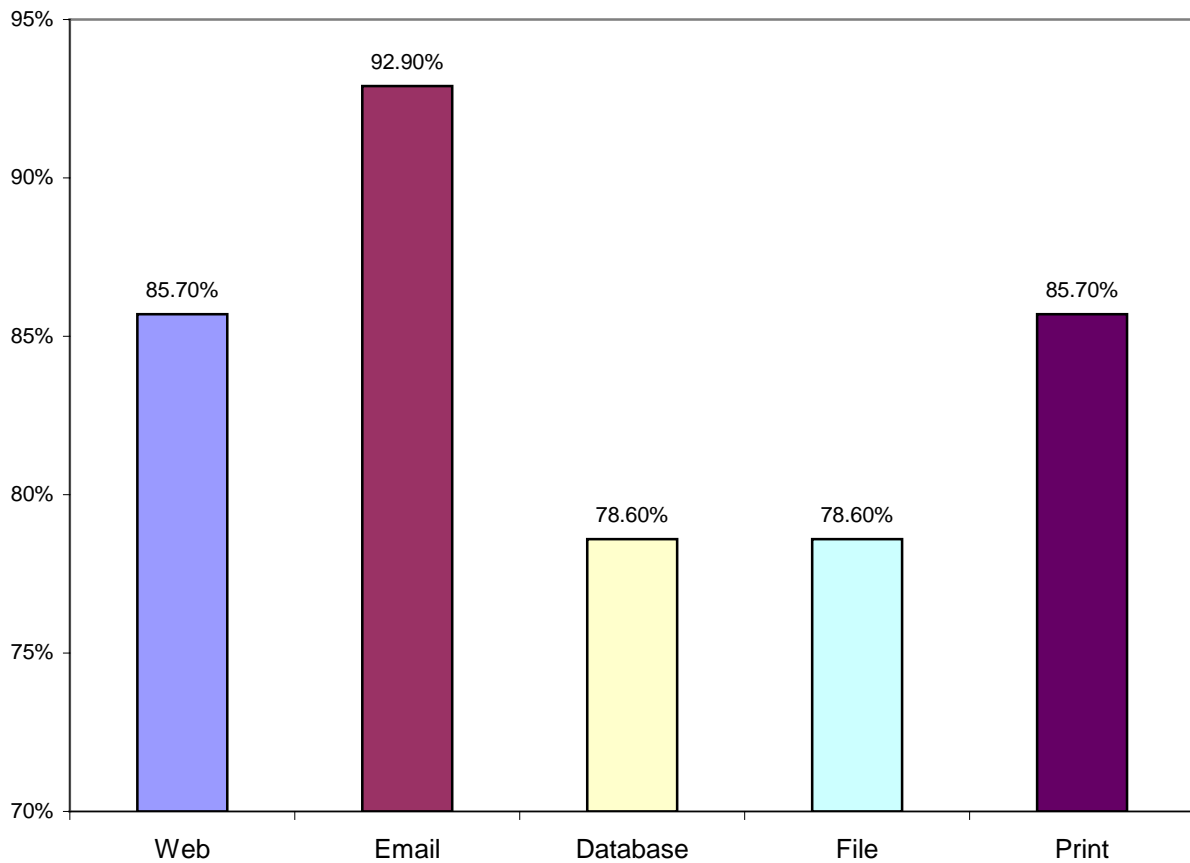
Figure 8: Percentage of Educational Units with Networks



Servers

Several types of servers are found in the various educational units surveyed. In the Tier 1 and 2 school systems, the most common servers are Web, e-mail, and file servers, with over 50 percent of the reporting school systems indicating their presence in the locations. The reporting Tier 1 and 2 community colleges have a higher rate of server presence. The most common servers found in the community colleges are Web, e-mail, database, file, and print servers. Figure 9 demonstrates the percentage of each server type within the surveyed community colleges.

Figure 9. Percentage of Servers in Tier 1 and 2 Community Colleges



Software

The popularity of Microsoft Office as the primary software suite is evident in all of the surveyed educational units. One hundred percent of reporting Tier 1 and 2 school systems and community colleges have Microsoft Office. The most popular version, for the educational units, is MS Office 2000.

In terms of other software, the majority of the school systems and community colleges rely on directives from the state coordinating organizations, the NC Department of Public Instruction, and the NC Community College System, respectively.

State Contract and Procurement

The educational units, perhaps because of the coordination efforts of their supervising bodies, use the state contract extensively. One hundred percent of both Tier 1 and 2 school systems and community colleges use the state contract for IT purchases. Additionally, over 92 percent of reporting school systems and community colleges competitively bid their IT contracts.

Finally, there is still less emphasis on cost/benefit or total cost of ownership analysis for IT investments, although it is significantly higher than the levels demonstrated in the local government units. Fifty-seven percent of Tier 1 and 2 school systems and 42 percent of Tier 1 and 2 community colleges use a formal process, like cost-benefit analysis, to justify technology investments and expenditures.

SECTION IV:

Opportunities for Advancement

❖ **Recommendations**

❖ **Conclusion**

Recommendations to the Rural Internet Access Authority

As we work to increase the use of e-government, it is helpful to think of the process as one that exists along a continuum. The following suggestions are offered to the Rural Internet Access Authority to assist their efforts to help local governments thoughtfully consider and implement e-government applications.

Planning

- Develop a *Strategic Planning Methodology and Template* for local governments. This should be done in collaboration with the North Carolina League of Municipalities and the North Carolina Association of County Commissioners and should include needs analysis, goal alignment, key stakeholder analysis, and risk assessment. The purpose of the planning methodology is to enable local governments of various sizes and capacities to begin a dialogue about e-government adoption.
- Provide training and technical assistance to local governments to support their use of the *Strategic Planning Methodology and Template*.
- Develop pilot sites, of varying size and forms of government, for testing the feasibility and applicability of *Strategic Planning Methodology and Template*.

Opportunities for Infrastructure

- Explore right-of-way infrastructure opportunities, including cable franchises, cellular towers, and public utilities.
- Identify areas where collaborative models and public-private partnerships are needed and present viable opportunities for improved access and availability of infrastructure.
- Highlight demand aggregation opportunities among units of government for right-of-way and other IT collaborative ventures.

Collaborative Applications Model

- Identify common applications that affect the majority of local governments, *i.e.*, tax collection applications.
- Develop a “best of breed” inventory of applications, with a variety of choices for various back-ends.
- Explore collaborative purchasing models for applications.
- Facilitate collaboration among end users of applications in order to share knowledge and expertise.

Technical Staff Enhancements

- Develop demand aggregation techniques for technical staff.
- Develop guidelines to simplify contracting for technical staff, across both local government and education units.
- Encourage the use of technology champions and volunteers as untapped resources within the community.

Each of these recommendations is derived from the data collected during the e-government survey. The recommendations address the primary issues and hindrances to e-government implementation, as identified by respondents from the government and education units surveyed. However, the recommendations are not all encompassing and do not represent the solution to individual challenges faced by particular units. The recommendations are a starting point for interested parties to consider in order to better foster and support e-government initiatives in Tier 1 and 2 counties, municipalities, school systems, and community colleges.

Conclusion

Information technology is a tool for accomplishing a specific task more efficiently and effectively. It enables local government to improve interaction with and access by the public, and to streamline internal processes and communications. The advantage of using digital data, as opposed to traditional, paper-based data, is the ease of maintenance and sharing. The power of e-government is multifold: e-government requires governmental investment in information technology and it is an innovative way to elicit citizen participation in government.

E-government demands that local government officials understand how to effectively tap into the services available to increase citizen interaction and streamline internal processes. The survey results reported in this article offer insights into the current status of information technology in rural North Carolina. They provide a benchmark for measuring future progress, as well offer a roadmap for information technology planning and investments in local governments. The results will help the Rural Internet Access Authority determine appropriate directions for funding in order to generate high-value returns for local governments and citizens.

ⁱ Jason H. Alexander & Joseph W. Grubbs, *Wired Government: Information Technology, External Public Organizations, and Cyberdemocracy*, 3 PUBLIC ADMINISTRATION AND MANAGEMENT: AN INTERACTIVE JOURNAL, No. 1 1998, available at <http://www.pamij.com/>.

ⁱⁱ David Landsbergen, Jr., & George Wolken, Jr., *Realizing the Promise: Government Information Systems and the Fourth Generation of Information Technology*, 61 PUBLIC ADMINISTRATION REVIEW 206 2001.

ⁱⁱⁱ The Rural Internet Access Authority is in the North Carolina Department of Commerce. Administrative and professional staffs are provided by the North Carolina Rural Economic Development Center, a private nonprofit organization that focuses on developing, promoting, and implementing sound economic practices in rural North Carolina. The Rural Internet Access Authority is governed by a twenty-one-member commission, which includes employees of state government, business and education leaders, members of the Microelectronics Center of North Carolina, and representatives of the state's telecommunications companies, including Internet service providers, rural telephone cooperatives, local telephone exchange and independent telephone companies, commercial wireless communications carriers, and the cable industry.

^{iv} Tier 1 counties include Alleghany, Ashe, Beaufort, Bertie, Camden, Cherokee, Clay, Columbus, Edgecombe, Graham, Halifax, Hertford, Hyde, Jones, Martin, Northampton, Perquimans, Richmond, Scotland, Swain, Tyrrell, Warren, Washington, and Yancey. Tier 2 counties include Anson, Bladen, Duplin, Hoke, Madison, Mitchell, Montgomery, Onslow, Pamlico, Pasquotank, Robeson, and Vance.

^v Donald F. Norris et al., *IS YOUR LOCAL GOVERNMENT PLUGGED IN? HIGHLIGHTS OF THE 2000 ELECTRONIC GOVERNMENT SURVEY* (Baltimore, MD: International City/County Management Ass'n, Feb. 27, 2001), available at <http://icma.org/download/catis/grp120/sgp224/e-gov2000.pdf>.