



TECHNOLOGY ASSESSMENT FOR CHEROKEE COUNTY

Executive Summary

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Study overview

The Cherokee County Economic Development Commission contracted with the Office of Economic Development (OED) at the University of North Carolina at Chapel Hill and the Research Triangle Institute (RTI) to conduct a technology assessment of the county. The purposes of this assessment were to:

- 1) Understand the current technology situation more clearly; and
- 2) Develop strategies to attract, grow and retain knowledge-based businesses.

This assessment updates the infrastructure inventory of Cherokee County done by RTI under the Connect NC project. This project is intended to help Cherokee County transition from traditional manufacturing to a more knowledge-based economy. This project is being conducted jointly with a broader effort to identify economic development opportunities more generally; the economic restructuring plan will be complete in February 2000.

In considering Cherokee County's opportunities and challenges in technology-based economic development, we have used a broad definition of technology infrastructure to include not just the physical elements but the institutional and human factors (including community college training programs, entrepreneurial environment, private sector commitment, etc.)

The needs of technology-based businesses

The rapid pace of technological change and innovation in the marketplace, combined with a global economy that forces communities to compete with their counterparts around the world, suggest that communities will need to continuously retool to attract and retain clean industry that pays good wages.

Technology companies generally like to locate in places that have an educated and highly motivated workforce and available training programs. Other important factors are of course the technology infrastructure, the basic infrastructure (electricity, water, sewer, and for some, natural gas), and the quality of life the area can offer.

In this study we focused primarily on the requirements of call centers, because they are among the high-tech employers whose skill requirements are within reach of the Cherokee County labor force. They are a good first step for a traditional economy trying to transition to a more knowledge-based economy because they can help in attracting related businesses.

A call center's typical location requirements are as follows. Many of these factors apply to other technology related businesses as well, so they are a good focal point for the county.

Available labor. A call center's top concern is an adequate pool of labor. Sometimes call centers seek out areas with high unemployment or a recent large plant closing. They expect turnover, so they prefer areas that have or will have many more available workers than are needed at first. Cherokee County has both available labor and low turnover relative to more urban areas.

Appropriate labor. Although the skill requirements for call center workers are typically only a high school education and basic computer literacy, some require college education, and most look for people with a strong customer service orientation who are bright, verbal, enthusiastic and assertive on the telephone. Some of Cherokee County's retirees may be appropriate for this type of work.

Affordable labor costs. Average wages for call center staff are \$14 to \$16 per hour in urban areas, and Cherokee County can probably recruit appropriate workers at \$8 to \$10.

Reliable and affordable telecommunications infrastructure. Call centers typically need broadband telecommunications lines and digital switching that offers Caller ID service to help automate their operation. Most of Cherokee County has access to high bandwidth digital telecommunications. GTE is actively involved in negotiating with a company interested in putting a call center in Western North Carolina. This should be a good test case from which others can learn what is adequate and lacking in the region's infrastructure for a call center.

Available suitable building. Often a decision to outsource the call center function is made with a planning horizon of only a few months. Communities with available buildings are thus in a much better position to compete. Cherokee County has a vacant Wal-Mart that may be suitable, as such stores have been converted to call centers in other rural areas including Kentucky.

Supportive business climate. A community's willingness to offer worker training, tax credits, access to grants and loans, and infrastructure is welcomed and sometimes assertively sought by call centers, as are low tax rates. Cherokee County's Tier 1 status as of 1/1/2000 should be an advantage in offering Lee Act tax credits, if the firm can be classified within the eligible data processing sectors (SICs 7371- 7379).

Quality of life. Companies are especially concerned about low crime (and low security costs) as a quality of life factor. If they intend to relocate management staff, of course they also consider the appeal of the community to an executive and his family in terms of amenities, quality of public schools, etc. Cherokee County has low crime, mountain appeal to IT executives, and good public schools.

Cherokee County also has some potential opportunities to develop more e-commerce businesses, though it should be noted that nine of ten e-commerce startups fail within a year. The main problem for many of these companies is order fulfillment. Companies need to have a good business plan, and to know how to handle timely delivery, customer service, bookkeeping, taxes, and all the other aspects of running a business. The Small Business Center at TCCC currently provides these types of business assistance and through a recent grant will be working with an e-commerce expert (Current Technologies Corporation) to expand these services. In addition, there are employers within the county that have a track record in order fulfillment that could be applied to developing e-commerce.

Assessment of human and institutional capital in Cherokee County

Some of the important indicators for assessing the human capital base of an area are the income, education, sectoral distribution, availability, trainability and overall quality of the population and labor force.

Income. According to indicators from the US Census Bureau, Cherokee County has lower income and deeper poverty than the rest of the state. This can be either an advantage or a disadvantage, depending on how it is marketed.

Education. The county is dramatically lower than the state average on several measures of education, but on par in others. For example, only 8 percent of county adults in 1990 had a 4-year college degree, versus 17.4 percent for North Carolina, yet the dropout rate for the three Cherokee County high schools is 4.7 percent, just under the state average of 4.9 percent. The eleven public schools in the county all received the “Exemplary Progress” designation for their 1998 end-of-grade test results. Six of these schools were designated “Schools of Distinction,” with over 80 percent of students testing at or above grade level. On end-of-year tests, the county’s high schools also scored in the top 10 of all North Carolina school systems in English, Biology, and Algebra I.

Age demographics. Cherokee County’s age distribution as compared with the state’s suggests a brain drain of the working age population. According to the local Employment Security Commission, young adults migrate out of Cherokee County because they cannot secure good professional jobs locally; the most popular destinations now are Atlanta, GA and Chattanooga, TN. Residents returning after age 45 and retirees represent another segment of the labor force that is growing.

Sectoral distribution of employment. The county has a larger manufacturing employment base (33%) than the state average (23%) and than urban areas such as Charlotte (11%). It also has a higher than average retail base for counties of its size. According to Advantage West officials, a strong manufacturing base has been an asset to developing software and other knowledge-based companies in the region because manufacturers provide a local customer base for the IT products.

Availability of labor. The unemployment rate in Cherokee County in 1996 was 6.6 percent*. Plant closings in the last two years have laid off an additional 1,000 people. The fact that Cherokee County has higher than average unemployment is currently an asset. Industrial location consultants often track plant closings to identify places where there may be available labor.

Trainability. According to regional marketing and state commerce officials, the key reason that industry comes to Western North Carolina is trainable labor. The training delivered by community colleges in a timely fashion is an important asset for businesses. 170 of the workers who have been laid off from the Levi-Strauss plant are currently enrolled at TCCC. According to the local ESC, employers hiring in the county are filling factory jobs, construction jobs (which are mostly seasonal), some clerical jobs, some manufacturing jobs, and only a few professional and government jobs. The workforce is decently trained for the manufacturing and service jobs that are available.

Perceptions of labor quality. According to the local ESC, the labor force tends to be loyal to employers and turnover is low, even in service jobs. Local manufacturing companies' assessments of the Cherokee County labor force vary. One company indicated that they have added 60 jobs since last spring and they have no trouble finding workers. Another company indicated it is always short on people with electronic engineering skills, and could add 20 jobs if such workers could be found.

Although there are only a few IT-related companies in the area currently, their perceptions of the labor force are reasonably encouraging. They currently recruit their senior staff from urban areas out-of-state. One company said it has trouble keeping qualified senior programmers because they can earn a lot more money in Atlanta, for example. The good news is that these companies hire and train junior and support staff locally. Though they generally indicate that there is not enough skilled support staff in the area, they have been approached by highly motivated applicants who want to learn the business. One company has a mentorship program that sometimes hires people and trains them for free.

Since their requirements are not based on natural resource or materials requirements, information technology companies can locate anywhere. This also means that even once attracted to an area, they may leave unless their needs continue to be met. Some of the institutional and community factors that affect the appeal of an area to a technology-based company include:

- ?? the availability and quality of higher education and other training programs;
- ?? the existence of a cluster of related companies with which to partner and share ideas;
- ?? quality of life factors; and
- ?? the supportiveness of the local government in providing financial or infrastructure incentives.

* Source: NC Department of Commerce County Profile

Education and training infrastructure. The Cherokee County Public Schools are generally considered among the best in Western North Carolina and have a strong technology emphasis. Tri-County Community College plans to require computer literacy as a condition for admission in the future, recognizing the importance of computers even in manufacturing and other non-IT jobs. TCCC offers a computer information services curriculum and is adding a networking curriculum through the Cisco Academy. TCCC currently offers several industry certifications:

- ?? Certified Cisco Networking Associate - CCNA (can work all routers, all hardware and install LANs)
- ?? Certified Novell Administrator - CNA
- ?? Certified Novell Engineer – CNE

Some local companies say they have had trouble attracting or keeping engineers because of the lack of a college that offers engineering courses in or near the county. UNC General Administration and Western Carolina University officials have said that the demand from the Tri-County area is currently too low to justify an engineering curriculum taught in person at TCCC. However, because of its North Carolina Information Highway site, TCCC can offer engineering courses from North Carolina State University by teleconference; UNC-Asheville and Western Carolina University also offer some engineering courses.

IT cluster or community. The development of a small information technology (IT) community in Cherokee County could be key in attracting other computer-related companies. Even though the virtual nature of their products allows them to collaborate even across great distances, IT companies do find synergies when they locate near other companies with related services. At least two computer companies have located during recent years to Cherokee County: UniPay and SoftNET Communications. Potential partnerships between them could attract some companies. For example, UniPay could become a local partner for SoftNET and do the online credit card verification and clearing for them and other IT companies that might move to the county. Similarly, Cherokee County could be a good location for an order fulfillment facility for an e-commerce-oriented company or call center; the facility could package and ship products for the call center's clients.

Quality of life. Both of the IT companies the study team contacted said they moved to Cherokee County because their owners loved the mountains. So far they have both been successful in recruiting senior programmers from south Florida or Atlanta by placing ads emphasizing the simpler, more beautiful surroundings of the mountains, away from the hassles of urban life. One of the attributes Cherokee County can boast is a much lower crime rate than the average city.

Supportiveness of local government. Cherokee County's position as a distressed county – as of January 2000, to be designated as a Tier 1 county for incentive purposes – is an opportunity to offer very attractive financial incentives to qualifying companies

under the William S. Lee Tax Act and related programs. In addition, the presence of an economic development commission with a full-time director is an important demonstration of the county's commitment to business development. Businesses of all kinds appreciate having a single point of contact to help them access the labor, infrastructure, financial or other services that allow them to be competitive.

A county that has a demonstrated interest in technology-related businesses is of particular appeal to an IT company. One indicator of this interest is a visible person or persons who understand the language, pace, complexity, and pricing of technology infrastructure, services and labor requirements. There are several people within the county who have some of this understanding, but they are using it to help their own organizations in trying to keep up with rapid change. There is currently no public servant in such a role.

Assessment of current technology infrastructure in Cherokee County

In this section, we assess the specific telecommunications infrastructure in the county, based on contacts with providers and other available data. Here we present the key findings of our assessment without going into any technical detail; fuller information and definitions are provided in the body of the report.

Cherokee County businesses have access to a number of high-speed telecommunications services provided by local and national Internet service providers (ISPs). The services include state-of-the-art technologies like frame relay, asynchronous transfer mode (ATM), and Integrated Services Digital Network (ISDN).

Local ISPs (Dnet and WebWorkZ), inter-exchange carriers (e.g. AT&T, MCI WorldCom, Sprint), and national ISPs (e.g. GTE-I, UUNET, EarthLink) can and do provide Internet access and long distance connections. GTE, the local phone company, owns only the hardware. Recent investments have made basic rate ISDN available to large areas of Cherokee County. Prime rate ISDN (a much higher bandwidth), is available everywhere in the county, as is frame relay and ATM (the most advanced Wide Area Network solution available in the marketplace today).

Dedicated lines are an old technology where a customer buys the exclusive right to use the full bandwidth of a connection between point A and point B. This technology is an inefficient use of resources, because nobody else can use excess capacity when the "owner" of the line does not use it, and might soon become obsolete in areas where other, newer technologies are available. It is also the most expensive connection between two points.

Both ATM and frame relay can provide the same kind of quality service that a dedicated line offers, but at a much cheaper rate. The main difference is that a customer does not always have access to the full bandwidth (e.g. a T1), but to a minimum guaranteed fraction of that bandwidth (e.g. 128K or 256K). The price for the service is based on that fraction. Frame relay and ATM take advantage of the fact that not all

customers need maximum capacity all the time. The technology allows users to transfer data at a much higher speed (in our example up to a T1) when there is enough capacity and no congestion. In other words, a customer pays the price for a guaranteed speed and gets extra bandwidth for free whenever it is available.

The North Carolina Information Highway (NCIH) is an ATM backbone. That means that NCIH users do not use dedicated lines. One of the most important applications carried out over the NCIH is telemedicine, which carries very sensitive information that would be compromised by even the most minor of delays. Thus ATM may be a good, lower cost alternative for some users who used to require dedicated lines.

For most businesses, ISDN (basic rate for small businesses, prime rate for users with high bandwidth demands), frame relay, or ATM are possible solutions. All three services meet the needs of business customers. Businesses should consult with the providers to determine the optimal solution based on applications and needs.

There is a widespread public misperception about bandwidth requirements, which is fueled by misinformation published in the media. For example, on December 4th, 1999, the Raleigh News and Observer characterized a T1 line as “basic level of Internet access.” This statement is simply wrong. Most business applications require far less bandwidth than a T1 line, which is 1.544 Mbps or 1,544 kbps. Many useful and common multimedia applications are possible at very reasonable data rates:

- ?? 64 kbps: telephone-quality audio
- ?? 100 kbps: simple application sharing
- ?? 128 kbps to 1 Mbps: videoconferencing
- ?? 128 kbps - 1.5 Mbps: Computer Telephony Integration (call center)
- ?? 14 kbps - 6.0 Mbps: telecommuting/SOHO (small office, home office)
- ?? 500 kbps - 6.0 Mbps: local web site hosting (ISPs), telemedicine.

This list shows that there are no common applications that need at least a T1 line. While conventional dialup access is limited to 56 kbps, frame relay, ATM, and in most cases ISDN offer the bandwidth needed for all applications.

Pricing summary:

- ~~///~~ Access charges to the closest POP or the next frame relay or ATM switch are regulated by the Federal Communications Commission (FCC) or State.
- ~~///~~ Charges for dedicated point-to-point lines are mileage and jurisdictional dependent (BellSouth and GTE rates are both regulated, but they are not necessarily the same).
- ~~///~~ Dedicated lines can be more expensive in rural areas if the inter-exchange carrier passes on the full amount it has to pay to carry traffic to the closest POP.

- ✍ Frame relay and ATM access charges are exactly the same for customers in urban and rural areas and are not mileage dependent.
- ✍ Whereas all local phone company charges are regulated, inter-exchange carriers (AT&T, etc.) and ISPs can offer discounts and even lose money.
- ✍ Different providers can and will offer different prices for the same service. All rates are negotiable.
- ✍ The pricing mechanism is far more complex than presented in the media. Again, the *Raleigh News and Observer* quoted the “price for a T1 line” with \$247 in Wake County and \$2,670 in Vance County. Those numbers reflect the FCC regulated rates between a specific location (community college) within the county and the closest point of presence (POP). However, this is only one part of the total costs. In most cases, ISPs or inter-exchange carriers sell a complete package to the end user. The price includes the regulated access charge to the POP and the non-regulated charges between POPs (the ISPs own that part of the connection and can charge whatever they want). ISPs can decide to discount rates and even to lose money, so they can offer special deals to customers (either in urban locations, but also in rural areas). For example, two different inter-exchange carriers might price the same dedicated line from Murphy to Blacksburg, VA, at very different rates.
- ✍ Unlike the mileage and jurisdictional-dependent rates for dedicated lines, frame relay and ATM services are available for a flat rate, which is the same for all GTE services in North Carolina. Again, the ISPs sell complete packages, including the local access and the Internet access charges.
- ✍ Local ISPs usually offer more affordable service in rural areas than national providers do. For example, Dnet charges less for T1 frame relay Internet access (\$1,100/month) than EarthLink (\$1,314-1,460). To illustrate the complexity of the pricing mechanism, Dnet also includes the regulated charges that they have to pay to GTE for the connection to GTE’s frame relay switch in Sylva (\$530/month, less for term contracts) while EarthLink currently offers a special rate of \$300/month for the connection to the closest EarthLink POP.

Current use of information technology in Cherokee County

Public institutions and private businesses combined use a fairly substantial amount of bandwidth. There are at least eight users in the county currently who connect with a T1 line to other locations or the Internet. Most of those high-speed connections are dedicated (leased) lines, connecting businesses in Murphy to their corporate headquarters.

The North Carolina Information Highway (NCIH) allows public institutions to use state-of-the-art videoconferencing technology and other high bandwidth applications.

Tri-County Community College and the Cyber Campus at Murphy High School provide well-equipped computer classrooms and videoconferencing facilities for educational use. Hardware and Internet connections are adequate, thanks to recent state investments and resources made available through the e-rate program.

Most small local businesses still use 56K dialup service to connect to the Internet. As in many other locations (including urban areas), the quality of the phone lines frequently only allows connections at slower speeds.

Table 1 summarizes the IT situation for several key employers or types within the county.

Table 1: Current IT situation for public and private employers in Cherokee County

	What is in place	Provider(s)	Costs per month	Needs/possible improvements
Tri-County Community College	T1	State of North Carolina (ITS)	\$2,992	Need additional tech staff. Planning for Internet2.
Cherokee County Schools	Cyber Campus: T1 12 schools: 128K dedicated access	State of North Carolina (ITS)	\$2,992	No pressing hardware needs, but need at least one computer technician
Cherokee County	56K frame relay and dialup service			Need IT person
Murphy Medical Center	T1	GTE	\$1,700	Satisfied with current situation
Divisions and subsidiaries	T1 frame relay (2) T1 leased line (3) 56K dialup (1)	AT&T (3), Sprint (2), WebWorkZ (1)	T1: \$2,000 - \$5,000 (including Internet access)	Main issue: costs. AT&T customers are more satisfied with the current situation. Possibly upgrade 56K access
Small local businesses	128K frame relay (1) 56K (or less) dialup access (6)	Sprint (frame relay) –(1) MAIN (1) Dnet (1) WebWorkZ (4)	\$800 for frame relay	More bandwidth at affordable rates, ISDN service, more information about services

Recommendations for Cherokee County

There are several aspects of the current situation in Cherokee County that should be improved to make the county a more attractive location for technology-dependent businesses to expand or locate. These relate to making improvements in:

- ?? the workforce' s educational attainment and skills
- ?? information from providers, current and potential, to technology users, current and potential

- ?? problem-solving and negotiation and with providers and regulators
- ?? communications among businesses and other employers
- ?? leadership from business, education and government

Figure 1 summarizes the staging of recommendations for the county. Additional details on these suggestions are provided in Section 6 of the full report. The arrows between elements are intended to indicate how short-term steps are directly instrumental to longer-term initiatives. The diagram also conveys the important roles for several actors working together. The first column of items can be done over the next year; the middle column in two to three years; and within five years the county should be well under way in knowledge job creation.

A final recommendation to Cherokee County is to work with the Rural Prosperity Task Force to be a model county for the new initiatives it is proposing to bring IT to rural counties in the state. However, the county can proceed with the recommendations in this report right away, without waiting for the outcomes of the Task Force's work.

Figure 1: Phasing of recommendations for various Cherokee County players



