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ROLES FOR LOCAL GOVERNMENTAL, EDUCATIONAL,
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ROLES FOR LOCAL GOVERNMENTAL, EDUCATIONAL, AND RELATED ENTITIES IN RURAL TELECOMMUNICATION DEVELOPMENT

By

Ronald Kerner Siegel Jr.

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ABSTRACT

ROLES FOR LOCAL GOVERNMENTAL, EDUCATIONAL, AND RELATED ENTITIES IN RURAL TELECOMMUNICATION DEVELOPMENT

By

Ronald Kerner Siegel Jr.

The development of advanced telecommunication services in rural America has become increasingly important in recent years. Advanced services are an essential tool when attempting to maintain a suitable quality of life and successful economy in rural communities. Although demand for such services has increased, infrastructure development and competitive services similar to those in urban locations remain limited. This study assesses telecommunication uses and demands of residents, businesses and public entities in rural northeast Michigan and suggests policies, relationships and activities rural governmental entities should adopt to promote or attract advanced telecommunication services in rural locations. Research suggests that information technology use is relatively high and advanced telecommunication services to compliment the technology are highly desired. The general recommendation of the study states that local government, public service institutions, telecommunication providers, and related entities must cooperate to aggregate the development of advanced telecommunication services through organized planning, purchasing, and education.

In dedication to my family and friends, for their love, support and patience;

I could have never gone this far without you.

ACKNOWLEDGMENTS

The author would like to thank Professor Ronald Choura, Dr. Thomas Muth, Dr. Johannes Bauer, Dr. Carrie Heeter, Rachel Isler, Kim Croel and the rest of the faculty and staff of the Michigan State University Department of Information Studies and Media for their continual assistance and valuable advice. Never be afraid to approach a professor and even befriend one. They are the gateway to your career and the mentors who guide you to it.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

The development of advanced telecommunication services[1] in rural America has become increasingly important in recent years. Advanced services are an essential tool when attempting to maintain a suitable quality of life and successful economy. Although demand for such services has increased, infrastructure development and competitive services similar to those in urban locations remain limited. Rural telecommunication providers are generally unwilling to introduce advanced services due to a lack of demand, slow return, and high over-head investment costs.

While the needs of rural societies are over-looked, urban societies are becoming increasingly technologically proficient as new telecommunication services and complimentary technologies are made available. This trend will steadily increase an already large technological divide that rural communities will not be able to bridge. Without direct involvement from the states, local governments and related entities, rural communities will continue to suffer from advanced telecommunication deficiencies that will in turn slow the technological evolution of their society.

This study assesses the telecommunication use and demands of residents, businesses and public entities in rural northeast Michigan and suggests policies, relationships and activities rural governmental entities should adopt to promote or attract advanced telecommunication services in rural locations. Although this research focuses on a specific geographical area in the State of Michigan, it may be possible to generally

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[1] For the purposes of this paper, the term 'advanced services' refers to telecommunication services such as Digital Subscriber Lines (DSL), Cable Broadband, T-x, OC-x and other high bandwidth applications.

infer that rural communities across the nation share similar characteristics and challenges; in which case such communities may benefit from this paper's ideas and/or solutions.

1. Telecommunications in Rural Environments

As the quality standards of telecommunication provision change and the take-rate of advanced services increase on a national basis, rural telecommunication providers continually find it difficult to answer the demands of the rural public. Urban and suburban communities typically benefit from the implementation of new services and technologies, unlike rural communities that rarely see new infrastructure investments and service roll-out. A study by Robyn Greenspan revealed that,

> "19 percent of online rural residents have broadband connections at home, compared to 36 percent of urban residents and 32 percent of suburbanites. Availability is likely to be a factor as roughly 25 percent of rural users didn't think they were able to get a broadband connection in their community, compared to 5 percent of urban users, and 10 percent of those in the suburbs."[2]

It is difficult for providers to justify the need to introduce new services since the low population in rural areas create a longer than normal return on investment. Such barriers result in a lack of new outside and central plant development and higher than normal subscription rates.[3] It is therefore common to see communities with small, dispersed populations and slow economies with limited advanced telecommunication services.

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[2] Greenspan, Robyn. "The Digital Dirt Road Divide". 23 February 2004.
< http://www.clickz.com/stats/sectors/demographics/print.php/3316541>

[3] This situation commonly occurs in rural areas that are served by large incumbent providers who do not generally qualify for high-cost Universal Service funding. This statement may not apply for smaller telecommunication providers who may otherwise qualify for and receive such funds to expand their infrastructure.

1.1 Rural Environments (USA)

To fully understand rural telecommunication deficiencies, it is necessary to explore the demographic characteristics, benefits, and challenges of rural environments. Rural communities are typically described as geographically dispersed areas with low population densities. The United States Census Bureau defines rural areas as, "any incorporated place or census designated place with fewer than 2,500 inhabitants that is located outside of an urbanized area."[4]

Whether or not a community is considered rural may depend purely on opinion; a city that has a population of over 2,500 can still contain certain demographic characteristics that would classify it stereotypically as a rural community. According to research that was conducted by the Kellogg Foundation[5] in several hundred rural communities across the nation, rural areas are commonly seen as closely-knit, traditional communities with a superior work-ethic. They are serene, beautiful, populated with animals and their landscapes have an abundance of trees and farm land. Figure 1.1 from the Kellogg study outlines words or

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[4] The United States Census Bureau, "Urban and Rural Classifications," n.d., <http://www.census.gov/geo/www/GARM/Ch12GARM.pdf> (12 June 2004)
[5] W.K. Kellogg Foundation, "Perceptions of Rural America". 18 June 18 2004. <http://www.wkkf.org/pubs/FoodRur/Pub2973.pdf>

Table One

Which words or phrases best characterize rural America? (multiple responses accepted)

A strong sense of family	33%
Hard working	31%
Commitment to community	21%
Strong religious beliefs	20%
Self-sufficient	14%
Loyal to their country	11%
Tough or resilient	5%
Behind the times	4%
Tolerant of others	3%
Lacking initiative	2%
Sophisticated	1%

Figure1.1 Kellogg Foundation
http://www.wkkf.org/pubs/FoodRur/Pub2973.pdf

Table Two

What problems do you think rural America faces? (multiple responses accepted)

Lack of money/poor	19%
Over-development/sprawl	17%
Price of crops	14%
Droughts/weather	11%
Lack of opportunities	11%
Decline of family farm	8%
Isolated/lack of exposure	8%
Pollutions	7%
Schools/education	6%
Influences from the city	4%
Young people moving away	4%
None	4%
Farmers selling land	2%
Behind the times	2%
Transportation	1%
Other	13%

Figure1.2 Kellogg Foundation
http://www.wkkf.org/pubs/FoodRur/Pub2973.pdf

phrases that represent rural America. A strong sense of family, commitment, and work ethic seem to best describe rural communities, while ideas of sophistication and lack of initiative are rarely considered.

Rural communities commonly suffer from social and economic difficulties; Kellogg research noted that 46% of rural respondents said they have considered leaving their region due to these difficulties. Among the most serious problems are a lack of money and opportunities to advance careers; 63% of the rural respondents believe that those in rural areas have fewer opportunities than suburban citizens and only 6% believe that rural residents have more. Figure 1.2 shows the most common challenges for rural America according to the Kellogg Foundation. Such locations generally lack adequate health care facilities, advanced or content rich education, cultural resources, and opportunities for professional advancement. Education in rural areas is a continual

challenge due to low revenues and the inability to support larger school systems; the same unfortunately applies for health care facilities. Youth retention is yet another concern; due to the lack of higher education and career opportunities, rural youths are more inclined to re-locate to more populated areas.

Our society commonly views rural America as farming communities, although only 11.7% of rural employment consists of farming or related occupations. Most occupations come from the service and manufacturing sectors, which employees over half of rural residents. Rural communities have a deficiency in high-tech or information technology (IT) jobs, mainly because there is no telecommunication infrastructure or educated workers to attract such positions.

There is an increasing general need for change in rural communities; the divide between rural and urban communities is increasing every year in terms of job opportunities, economy, education, health care, public service and public safety. The quality of life in urban areas is quickly becoming an American standard while the rural segments of the nation are left looking for answers to its problems.

1.2 Benefits of Advanced Services in Rural Environments

In the last decade, both federal and state governments have acknowledged the highly publicized lack of telecommunications in our society and have initiated an active role in promoting advanced telecommunications in all areas of the country. The United States Telecommunication Act of 1996 section 254 states,

> "Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and

information services, including inter-exchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas".[6]

Section 706 also states,

"The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms)".

Despite an increase in legislation from the government, rural America remains far behind its urban counterpart in advanced telecommunication development. It is theoretically simple for the federal and state governments to mandate development, but it is much harder to implement strategies to spur it. Therefore, the issue of rural telecommunication development is commonly left for the local governments to solve with the hope that the quality of life and economic development of their communities will improve over time.

- **Quality of Life**

Quality of Life (QoL) is a general term to describe the degree of success or comfort in an individual's life. It is defined as,

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[6] United States. United States Telecommunication Act .47 USC 157

> "An individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, and level of independence, social relationships, and their relationships to salient features of their environment."[7]

The quality of life in rural areas can sometimes be viewed differently. Some rural residents claim that the stereotypical characteristics of rural communities such as low population, low crime and serene nature are a quality of life. Despite this, rural communities are acknowledging that without advanced telecommunication infrastructure, the quality of their lives is diminished significantly. The current trends of urban sprawl or residents who work in populated areas and live in rural areas are magnifying this issue. Additionally, the transplantation of urban retirees to rural areas and the purchase of housing for vacation or investment add to the need for advanced services. This need begins to develop when urban residents who are dependent on advanced telecommunication services re-locate or partially live in rural areas and have minimal or no access to their commonly used services. The quality of life of each urban resident who experiences this problem is diminished, which creates problems for rural governments who try to attract new businesses and residents to the community.

The common residence and business in America are becoming increasingly dependent on integrated telecommunication technologies. A television with cable TV or satellite is common in many rooms, with multiple broadband enabled computers

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[7]Saskatoon Health Region. December. 2004
<http://www.sdh.sk.ca/ships/PHReports/senreport/Main/Glossary.htm>

communicating via wireless technology. Parents can easily reach their teenage children on a cell phone and a young child can play broadband video games with another child in China. Businesses can send emails to a worker's PDA across the hall or an employee can access a corporate mainframe in a city four states away. All of these uses make our lives easier, profitable, and more enjoyable. These benefits are unfortunately held back from rural communities, because they cannot physically gain access to them. A virtual bridge must be created to rural communities so the benefits of the urban society can slowly supplement and improve the deficiencies of the rural society.

Quality of Health Care

Many public representatives have continually expressed the need for advanced telecommunications to enhance rural healthcare. Advanced services will enhance communications between emergency services and physicians and broadband services will give physicians the opportunity to participate in distance learning, x-ray or document sharing, consulting and other resources that are not possible without advanced telecommunications. In the world of medicine, it is imperative to have instantaneous and dependable communications and by improving such services in rural healthcare environments, residents will surly see vast improvements in the quality of their services.

Quality of Education

The American schools system is becoming more dependent on computer technology everyday. Computer labs and classrooms with high-speed Internet access are very common in urban areas and schools are continually integrating learning with computer use. Unlike urban school districts, rural schools rarely have access to new technology and the telecommunications to support it. If rural schools can obtain access to advanced

services, the Internet can be utilized for its educational potential and distance learning can be implemented to provide a broader range of curriculum that would otherwise not be available to rural students.

- **Economic Development**

Economic development has long been a problem among rural communities, something that economic developers have tried hard to improve. Businesses generally refrain from opening in rural communities unless their business model serves a specific rural function. This is commonly due to low populations, a shortage of IT proficient workers, and a lack of advanced telecommunication infrastructure in rural areas. Businesses in general, have become dependent on electronic commerce to supplement profits and improve outreach to buyers; something that is becoming especially important to businesses in remote locations that have few tools to reach new customers. Advanced telecommunications can provide new strategies for rural businesses to maximize their profits and simultaneously assist in the economic development of their communities. Rural residents and businesses will eventually assimilate the uses and gratifications that compliment such services and small businesses will become technologically proficient as well as the employees that run them. The ability to attract large businesses that drive economic development is severely limited without the telecommunication infrastructure needed to support its business operations. The introduction of advanced telecommunications services and technologies are a key tool to attract new businesses, supplement the reach of entrenched businesses, improve the unemployment rate, and drive the economy of rural communities.

1.3 Barriers Preventing Ubiquitous Advanced Telecommunications[8]

- **Rural Characteristics**

Geography

Rural Geography and the challenges that it creates for telecommunication development are commonly over-looked. The hilly terrain not only makes it difficult for providers to reach subscribers, but also creates dead-spots for wireless providers who offer unlicensed and fixed services. Vegetation and large trees typically pose a problem for wireless dependent providers that suffer from interference due to the presence of water in the leaves of the vegetation. Additionally, the abundance of vegetation that inhabits the right of way and needed easements causes an extensive amount of clearing for providers when infrastructure is built. This clearing can also cause unrest with residents who do not want the natural beauty of rural areas to be disturbed.

Populations

The population concentrations in rural areas continue to be a problematic situation for the development of advanced services. Rural areas generally have low populations with both year-round and seasonal residents who own vacation properties. Additionally, rural populations are commonly dispersed with small clusters that tend to be far apart. Advanced services are sometimes available in close proximity to these clusters, but are generally not accessible to more reclusive customers who are too far from the providers. Low populations and fluctuating demand from seasonal residents reduce profits and

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[8] It should be noted that the rural telecommunication characteristics and deficiencies explored in this section are typical of rural northeast Michigan and are not necessarily applicable for all rural areas.

investment return for rural providers and commonly prevent them from investing in upgraded services.

Commercial Presence

The commercial presence in rural communities is typically small when compared to urban areas. This lack of business development is troubling for telecommunication providers who count on large business accounts that demand advanced and more profitable services. The Northern Lakes Economic Alliance (NLEA) suggested in their 2004 LinkMichigan report that, "The relatively low density of business and residents directly affects the level of demand for broadband services and therefore the profitability of businesses offering broadband services."[9]

The NLEA also stated that, "each potential customer is a relatively large fraction of the entire market in smaller communities. In some cases, a single broadband user, such as a school, large business, or the municipality itself, may represent a significant portion of the total broadband market."[10]

Therefore, one large business in a rural community can account for a significant amount of revenue and if none are present, rural providers are typically reluctant to implement more advanced services even if the residential population demands it.

Public Education

The lack of public exposure to advanced telecommunications has created an educational barrier between the rural public and typical telecommunication services that are commonly used in urban areas. The NLEA LinkMichigan study stated that, "when exposed to broadband services, members of the community showed a great interest and a

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[9] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 26.
[10] NLEA, 26.

desire for more education to both help them understand the potential these services offer, and for information on where and how to obtain the services."

The NLEA also said that, "there is a clear link between user familiarity and the demand for user broadband services in the NLEA region."

In theory, if rural communities are able to obtain a significant amount of exposure to the uses and gratifications of advanced services, demand will steadily increase as familiarity increases. If a lack of exposure and education continues, demand will remain low and rural providers will ignore the needs of a small minority public that desire advanced services.

Demand

Demand has remained a key problem for rural telecommunication providers and those that seek to improve availability in rural areas. As previously mentioned, without the development of product education that will spur demand and an increase in commercial presence, rural providers will continue to utilize legacy services in rural areas until the return on revenues are high enough for implementation. Until rural communities can aggregate enough demand, advanced services will remain an urban convenience.

Cost of Services

In 2004, $44,233,855.03 was issued by the Universal Service Administrative Company (USAC) to various entities in Michigan that qualified for Universal Service Funding (USF).[11] This amount was higher than most states and suggests that Michigan had a significant amount of providers in high-cost areas that needed federal assistance. This

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[11] Universal Service Administrative Company. Funding Commitments FY2004. <http://www.sl.universalservice.org/funding/y2004/waves/state_totals.asp>

implies that demand is low in Michigan high-cost (rural) areas and the cost of services is higher than normal. Due to the low average income that is generally associated with rural communities, rural providers do not typically roll out advanced services that its customers can not afford. As mentioned above, rural areas do not typically have institutions that demand high bandwidth services, which in turn limit the demand and feasibility of the services. Additionally, rural services are typically more expensive than urban services due to low demand, low populations, and slow investment returns. This situation tends to develop into a viscous circle where low demand creates high costs and in turn lowers demand even more.

- **Un-assigned and Un-served Exchanges**

Rural locations are commonly located near unassigned territories or exist within them. For example, as of May 1st, 2005 there are currently sixteen unassigned territories in the State of Michigan that are not served by an incumbent local exchange carrier. These dispersed locations are not generally served due to low populations and demand. These areas create difficulties when trying to develop ubiquitous networks because they create large gaps in basic telecommunication infrastructure and usually lack transport backbone. Such areas are unfortunately served upon the discretion of the local exchange carriers and are not usually required to build infrastructure in them.

Un-served areas continue to be an even more frustrating problem for consumers. These territories exist within assigned exchanges, but are typically not served for the same reasons as the un-assigned territories. Past communications with consumers in these areas have expressed a great amount of frustration due to continual marketing from providers that claim to serve areas, but in the end claim that they do not offer such

services or charge an exuberant amount of money to do so. These areas present a severe challenge to the ubiquity of rural telecommunications, because they are essentially hidden gaps in provider coverage that are commonly ignored or over-looked.

- **Technical Barriers**

Backbone Infrastructure

A lack of backbone infrastructure can be a significant challenge when attempting to improve service in rural locations. The most common backbone pipelines are typically high-speed fiber optics, which are typically owned by incumbent providers, consortiums or resellers who sell services to competitive local exchange providers (CLEC) and Internet Service Providers (ISP). General opinion suggests that most rural areas lack sufficient backbone to support broadband infrastructure, although it varies with each area. Incumbent providers typically own proprietary backbone, but do not usually make them accessible to other providers. In the case of Michigan, companies like Great Lakes Comnet have built or are planning to build fiber optic cable throughout the state for the transport of services, but have typically not installed them in the most rural areas as shown by the arrow in figure 1.3.

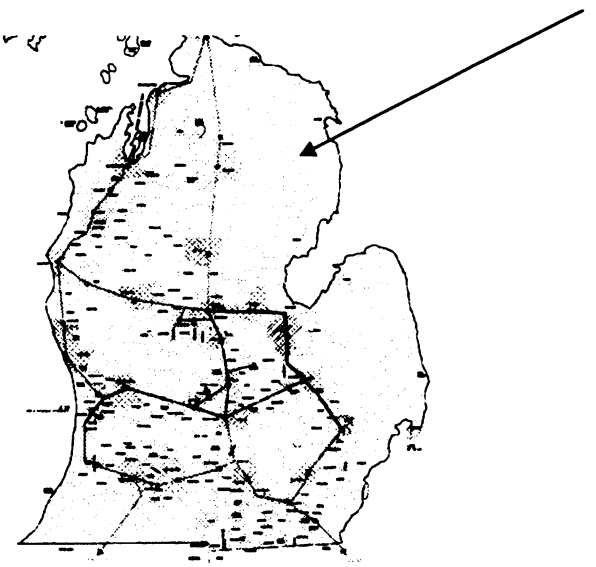

Figure 1.3 Great Lakes Comnet Fiber Backbone (2005)
http://www.glcom.net/glc_network_map.pdf

The Northeast Michigan Council of Governments (NEMCOG) and Michigan State University stated in their LinkMichigan Broadband Services Report (BSR) report that, "in recent years, the telecommunication backbone has experienced substantial growth and little has changed in the access network. The tremendous growth of Internet traffic has accentuated the lag of access network capacity."[12]

Until incumbent rural providers open access to their fiber or new fiber infrastructure is built, rural communities will not be able to gain the access needed for advanced services.

Last Mile Infrastructure

As shown above in figure 1.3, the west side of Michigan does have access to fiber backbone, which is more than likely due to a larger amount of populated areas that have more competitive providers serving them and more invested telecommunication infrastructure. The NLEA stated that, "contrary to public opinion, the backbone capacity

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[12] Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004. 60.

into the region (west coast of Michigan) does not currently represent a limitation to the availability of broadband services."

The NLEA also said, "As such, there appears to be no reason why providers in the NLEA region would be unable to scale backbone capacity as needed, the problem is the "last mile" distribution capacity down to the resident and rural end users throughout the region."[13]

Despite having the least amount of backbone infrastructure in the state, the NEMCOG also agreed that the last mile is more of a significant problem and said, "The last mile still remains the bottleneck between high capacity local area networks and the backbone network, with the most widely deployed broadband solutions consisting of cable modems and digital subscriber lines."[14]

As suggested by both the NLEA and the NEMCOG/MSU reports, rural areas can not adequately serve the broadband needs of its consumers unless sufficient backbone and last mile infrastructure is in place. The incumbent providers have either refrained from adding new infrastructure and or make it difficult for competing providers due to higher than average access costs. The NLEA suggested that, "traditional last mile solutions such as T-1 and DS3, which have been delivering the bulk of the broadband capacity in urban regions (with greater infrastructure), have not been able to reach much of the rural NLEA region because of cost."[15]

The demand for broadband services such as DSL and cable broadband have been continually increasing in rural areas, although most national providers who are also rural

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[13] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 25.
[14] Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004. 60.
[15] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 23.

incumbents have had little interest in upgrading their offices for the services due to a lack of possible revenue. Additionally, most rural cable providers typically provide basic analog cable and do not have the income or assets to invest in upgraded digital networks that can supply broadband Internet. CLECs also refrain form opening in rural areas due to high interconnection costs and a low customer base. The NLEA stated that, "the inability of providers to "cross-connect" medium bandwidth (128K to 768K, typical of most small businesses) commercial customers into single, larger capacity circuits in the telephone offices of many smaller communities has provided a significant roadblock to decreasing service cost and is an example of technical issues that impedes broadband growth."

These challenges force small rural providers and ISPs to purchase duplicate lines into and out of a Point of Presence (POP) to provide broadband services, which can be very expensive and technologically challenging. Most providers can not acquire enough commercial and residential users to pay for these services so they are commonly not pursued. This therefore leaves two solutions which are highly unlikely: compliance by the incumbent exchange carriers or legislative action.

Wireless Barriers

Wireless telecommunication services continue to have great potential as a solution for broadband deficiencies in rural areas. Unfortunately, as mentioned previously, the geographic characteristics combined with current wireless technologies make the solution difficult and sometimes unreliable. The NLEA wrote that, "Hilly terrain and tall trees impair the primary line-of-site delivery for wireless signals. That, along with pervasive

aesthetic concerns about the proliferation of antenna structures, limits the viability of wireless as a large scale distribution medium in the NLEA region."[16]

The concerns the NLEA stated are typical in most rural areas that do not desire an abundance of wireless infrastructure in the area. Many ISPs have attempted to provide wireless solutions, but many struggle due to the terrain of rural areas and the costs associated with the service. The NEMCOG explained that, "there is an increasing presence of second generation wireless providers (cellular and Internet) in the region that have been investing and expanding their networks to accommodate customers who desire wireless services."[17]

The NECMOG also stated that, "survey results did indicate low customer satisfaction with wireless services in general. It was found that many locations where wireless providers claimed to offer service were not as ubiquitous as claimed."

Rural consumers have continually complained about such services that claim to offer coverage, but can not successfully connect end users. This combined with the upfront user costs give rural consumers a false sense of hope that a broadband solution will be discovered.

- **Zoning and Right of Way (ROW)**

Inconsistencies in right of way and zoning policy continue to cause frustrations for local providers who either desire to build cable infrastructure or place wireless towers in rural areas. Most rural communities have multiple governmental organizations that have different ROW and zoning policies. For example, rural areas in Michigan have the

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[16] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 24.
[17] Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004. 3.

Michigan Department of Transportation, local planners, and county road commissions that all may have different ROW policies regarding tower placement, plowing depth, fees, and permit processes. The NEMCOG and MSU addressed this issue and stated that, "there needs to be unification between townships and cities in each county. If not, providers will have to seek approval in each city and township. If that proves undoable, providers will have to seek out each landowner and gain approval.[18]

Michigan recently enacted the METRO Act which created a unified ROW process, but many inconsistencies remain. ROW and zoning differences make it difficult for providers to expand infrastructure in a feasible manner and cease operations entirely in some cases.

[18] Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004. 159.

2. Telecommunication Usage and Availability in Northeast Michigan

The northeast portion of Michigan's Lower Peninsula proves to be a useful area when analyzing the effects of telecommunication deficiencies on rural society. As shown in figure 2.1 (gray areas), the geographical area alone has multiple unassigned exchange areas that are not served by incumbent local exchange carriers. These locations have no landline phone service and commonly have insufficient cellular coverage. This presents an abundance of problems for emergency services, police, and fire and also limits the ability to dial 911.

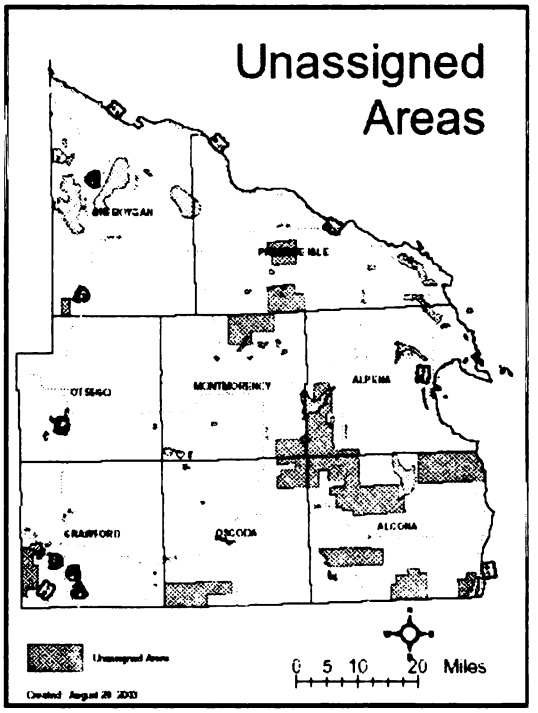

Figure 2.1 Unassigned Exchanges (in gray)
M-SITE Broadband Services Report

Aside from the more populated cities in the region such as Alpena, Rogers City, Grayling and Gaylord, most communities in northeast Michigan have limited telecommunication

choices. Due to its rural demographics, most telecommunication providers have invested little into advanced telecommunications for the region. The area has several small communities that were built strategically along the railroad and still exist despite the removal of the railways. These small towns are few and far between and do not generally have advanced telecommunication infrastructure.

Economic and population growth in Michigan rural communities has long been idle and their lack of consumer purchasing power prevents them from obtaining advanced services which, if available, are commonly more expensive than suburban services. To exemplify the scope of this problem, the 1999 income per capita in Oscoda County, which is located in rural northeast Michigan, was $15,697[19]. When compared to the 1999 income per capita in Michigan ($28,095)[20] and the United States ($27,939), Oscoda county consumers have an income that is nearly half of what the average Michigan and national consumer receives. Additionally, when comparing the population percent change of 0.5%[21] in Oscoda County from 2000 to 2003 to the states average of 1.4%, it is apparent that the county is not only economically distressed, but suffers form slow population growth. Oscoda County and other counties in the state with similar restraints must find solutions to aggregate new telecommunication services that will spur economic development. As the economic environment improves, the population and desire to reside in such areas will increase as well. If a solution is not discovered, its current residents will continue to economically suffer, and community growth will never occur.

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[19]U.S. Census Bureau. Michigan Quick Facts. 1 Feb 2005. <http://quickfacts.census.gov/qfd/states/26/26135.html>
[20]Bureau of Economic Analysis. Regional Economic Accounts. <http://www.bea.doc.gov/bea/regional/spi/drill.cfm>
[21] U.S. Census Bureau. Michigan Quick Facts. 1 Feb 2005. <http://quickfacts.census.gov/qfd/states/26/26135.html>

General public opinion reveals that incumbent local exchange carriers have not made enough upgrades to address consumer demand and most are not generally pleased with their service. Local and long distance service is generally adequate, but more advanced services such as T1-T3 are commonly overpriced in areas where it is available. DSL is available in select areas, but only where upgrades have been made to central offices to support Digital Subscriber Line Access Multiplexers (DSLAMs). Figures 2.2-2.7, show ILEC service coverage, which was derived from data collected by the State of Michigan's Link Michigan initiative in 2003.

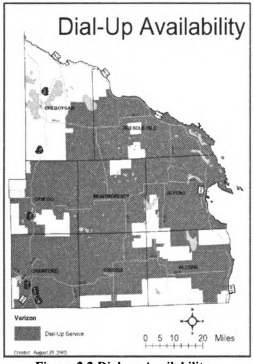

Figure 2.2 Dial-up Availability
M-SITE Broadband Services Report 2003

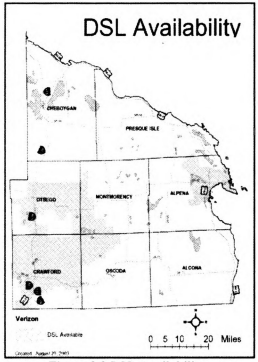

Figure 2.3 DSL Availability
M-SITE Broadband Services Report 2003

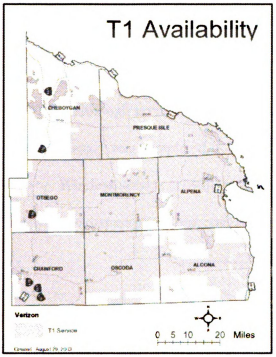

Figure 2.4 T1 Availability
M-SITE Broadband Services Report 2003

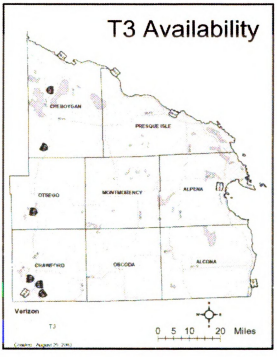

Figure 2.5 T3 Availability
M-SITE Broadband Services Report 2003

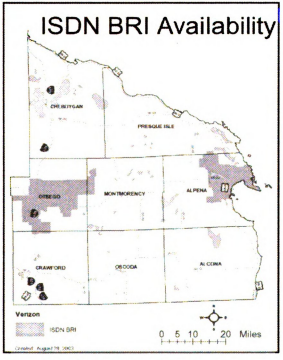

Figure 2.6 ISDN BRI Availability
M-SITE Broadband Services Report 2003

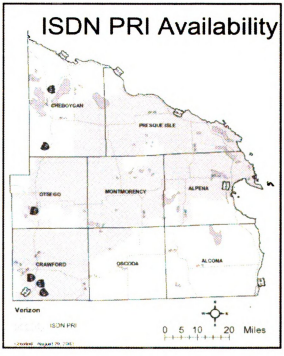

Figure 2.7 ISDN PRI Availability
M-SITE Broadband Services Report 2003

Dial-up service to access the Internet is common, although absent in the unassigned areas, as is all the services in these figures. T1 and T3 are widely available, although DSL and ISDN have limited coverage. It should be noted that this data was obtained in 2003 and although unlikely; upgrades may have been made by the incumbent provider since the study was completed.

Wireless service is available, although it is typically not dependable. Figure 2.8 shows how dispersed cellular converge is in the area.

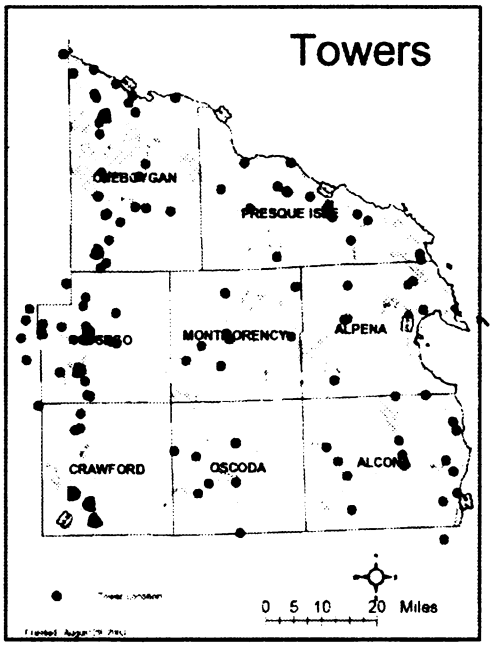

Figure 2.8 Towers
M-SITE Broadband Services Report

The lack of towers throughout the region creates many dead zones where wireless service is not available or barley usable. The elevated terrains and abundance of vegetation within the service area also affect the functionality of wireless services.

The demographic characteristics of northern Michigan are fairly typical for rural communities. Oscoda County for example, is the least populated county in the region

with a current population of around 9,401[22]. In 2002, the county had 3,921 households with a median income of $28,228 per household in 1999. In 2001, the county had 263 non-farming businesses. Alpena County, the most populated in the region, has a population of 30,781 with 12,818 households that have a median income of $34,177 per household. In comparison, Oakland County, a large county in southeast Michigan, has a population of around 1,207,869. The county had 471,115 households and a median income of $61,907 per household, with 42,103 non-farming businesses. Other counties in the region typically fall demographically between Oscoda's and Alpena's statistics. These counties have low populations with few households and low median incomes when compared to urban areas. Such characteristics are not appealing to telecommunication providers who develop business models that are based on high fixed cost and large account acquisition.

The State of Michigan decided in 2001 that it was necessary to conduct studies in all Michigan counties to determine what telecommunication services are used, which services are desired and most importantly, how to supply such services and new technologies. The state granted millions of dollars to Michigan counties under the LinkMichigan Initiative to assist broadband planning across the state. The Michigan Economic Development Corporation (MEDC) wrote in a LinkMichigan vision proposal,

> "Michigan is a recognized leader in competing for new business growth and attracting and retaining a world-class workforce, but unless greater telecommunications access becomes available to all parts of the state, Michigan stands to lose its prominence.

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[22] U.S. Census Bureau. Michigan QuickFacts. 1 Feb 2005. <http://quickfacts.census.gov/qfd/states/26/26135.html>

Facilitating the development of the most advanced and robust telecommunications infrastructure in the country is the goal of the LinkMichigan initiative."[23]

In 2005, Michigan is now struggling with one of the worst unemployment rates in the country and it would appear that the primary goals of the Link Michigan Initiative may not have been achieved. Although there is still much promise for the State's infrastructure and much still needs to be done. More focus must be made on rural areas so the state can one day achieve the ubiquitous broadband network that the initiative was created to aggregate.

2.1 Broadband Services Report (BSR): Usage and Availability

On April 21st, 2004 the Michigan State University Site for Information and Telecommunication Experimentation (M-SITE)[24] released a State of Michigan grant backed report on telecommunication availability and usage in the counties of Alpena, Alcona, Presque Isle, Oscoda, Montmorency, Crawford, Otsego and Cheboygan Michigan (shown in figure 2.2).

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[23] Michigan Economic Development Corporation. 2003. <http://medc.michigan.org/cm/attach/94595AF5-BAE2-4BEE-856A-22DA8A130538/linkmichigan2.pdf>

[24] It should be noted that during the time of the study, the author of this paper acted as the M-SITE Project Manager, coordinated its research, and co-authored the report.

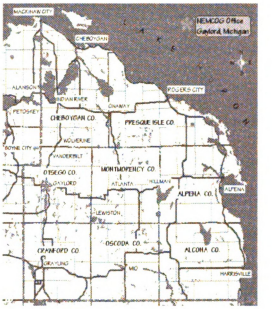

Figure 2.9 Northeast Michigan
http://www.nemcog.org

The Northeast Michigan Council of Government (NEMCOG), a representative body of the eight counties, contracted M-SITE to provide strategic recommendations based on extensive survey data from residents and businesses within the eight counties. Several surveys were also mailed to local providers, although most of the provider data within the report came from direct conversations, electronic correspondents and data from state contracted research firms. Obtaining proprietary information from providers proved difficult, although a thorough assessment of current provider services was obtained.

- **Business Survey Results and Analysis**

The M-SITE business survey[25] was designed to ascertain business classification, telecommunication service usage, and computer use statistics within the eight counties. Each business was asked to rate their subscribed to services, express their degree of interest in telecommunication training programs and decide how telecommunications

[25] Please see Appendix p.108 for actual survey.

influences their desire to maintain current business locations. A three-page survey was mailed to randomly selected businesses in the eight county regions. Exactly 5,447 surveys were distributed with a return rate of 13.4% or 732 usable surveys.

Each business was asked to identify themselves out of fourteen different classifications. Of the 732 surveys, 47% classified themselves as 'other'. By process of elimination, it can be assumed that these respondents were lodging, fishing, camps or hunting lodges that did not have proper representation in the fourteen pre-selected categories, or they did not know where to classify themselves. Of the remaining surveys, 12% responded as associated with the government and 2% with agricultural affiliations.

Businesses were then asked to record their computer, networking and Internet use. When asked if computers were used in everyday affairs, 88.4% responded with YES and 10.5% responded with NO. When asked if their computers were networked together, 52.3% said YES and 37.4% said NO. When asked if the Internet was used on their premise, 81% said YES and 16.5% said NO. Based on the survey results, businesses have a high computer usage rate, but many have not networked their computers together. There is an obvious demand for computers and Internet use, but businesses either have no need for networking or do not possess the proper education or resources to establish a network. Most businesses in the area tend to be small or stand-alone and do not require the networking capabilities that businesses with a large amount of infrastructure may demand. Despite their size, rural businesses should attempt to learn more about networking and how their business may benefit from ubiquitous communications, more specifically for functions like point of sale (POS) services which greatly enhance business operations such as accounting, inventory and database organization.

Table 2.1 lists services a business may subscribe to for Internet service. For each service, each respondent was asked if they currently use it, wish to have it available, wish to have it but it is not yet available or if they were not interested in it. Table 2.1 contains percentages based on how the respondents classified each service. At the time of the survey, 57.4% of the businesses still used dial-up technology to access the Internet, 11.9% used cable service, and 5.3% used DSL. There appears to be a higher disinterest in services such as ISDN and T3, although there is still a slight demand for the services. 1.9% used ISDN and 4.3% wish to obtain it with 3.1% of respondents who desire it but cannot obtain it. 8.3% of the respondents either use T1 or T3 lines and 6.2% desire the service. Based on the results, ~30% of businesses in the region use broadband services and ~20% desire advanced services. Around one-third of the businesses in the area expressed difficulty in obtaining services and would use them if available. When considering the demand for broadband services, specifically cable modem and DSL service, the statistics seem surprisingly high for rural communities. In total, 29.4% of the respondents desire either service whether it is obtainable or not. When compared to national statistics from the FCC[26], both cable and DSL service increased in the United States by ~45% in 2003. The statistics in this study are obviously lower, but when taking into account the amount of residents per mile and available technology, the predicted demand is quite high. If more telecommunication infrastructure can be developed in rural areas the demand rate for services comparable to DSL and cable modems will certainly increase.

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[26] Federal Communications Commission. "Federal Communications Commission Releases Data on High-Speed Services for Internet Access". 8 June 2004.
<http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/hspd0604.pdf>

	Currently Use	Wish To Have and Available	Wish To Have But Not Yet Available	Not Interested	Did Not Respond
Dial Up Telephone	57.4%	0.7%	0.3%	3.7%	37.9%
Satellite PC	5.6%	5.7%	3.3%	12%	73.4%
Cable Modem	11.9%	9%	7.9%	7%	64.2%
DSL	5.3%	3.8%	7.7%	9%	74.2%
ISDN	1.9%	1.2%	3.1%	12.3%	81.5%
DS1/T1	6.1%	1.4%	2.5%	11.9%	78.1%
DS3/T3	2.2%	0.7%	1.6%	12.3%	83.2%
Frame Relay	2.6%	0.4%	0.8%	12.2%	84%

Table 2.1 Internet Connections Used
For 100% of Respondents

Table 2.2 lists typical telecommunication services a business may subscribe to for communications. For each service, each respondent was asked if they currently use it, wish to have it available, wish to have it, but it is not yet available or if they were not interested in it. The corresponding numbers are percentages based on how the respondents classified each service. Normal telecom services have a fairly high usage rate in the region. Call routing, cable TV, cell phones; network faxing, voicemail, websites, email and CLEC services have a high usage and the most surprising is cell phone use at 62.3% in an area that severely lacks cellular infrastructure. Cable TV is lower than average at 24.9%, but considering a lack of infrastructure and actual need by businesses, it is not surprising. The most interesting results are in the Not Interested category, where more advanced services such as VPN, videoconferencing, PBX systems, LANs, WANs, and wireless networks have high disinterest rates of almost 20%. This is more than likely due to a lack of need by businesses in the area and until improved

infrastructure and technologically advanced businesses move into the region disinterest in such services will remain high. Despite the low numbers, businesses did express interest and with economic development, interest will likely increase. Businesses of all genres are discovering the benefits of maintaining an electronic presence in a new world of global markets; the high usage rate of online services such as email (72.7%) and websites (42.5%) show a need for ubiquitous and dependable telecommunications.

	Currently Use	Wish To Have and Available	Wish To Have But Not Yet Available	Not Interested	Did Not Respond
Automated Call Routing	13.3%	1.9%	1.1%	17.1%	66.6%
Cable TV	24.9%	2.2%	2.9%	14.2%	55.8%
Cell Phones	62.3%	2.3%	0.7%	4.9%	29.8%
Company Website	42.5%	6.8%	1.2%	7.7%	41.8%
Competitive Local Phone Service	40.8%	4.8%	8.2%	5.6%	40.6%
E-mail	72.7%	1.6%	0.4%	3.4%	21.9%
Local Area Network	29.2%	1.4%	1.1%	12.8%	55.5%
Network Fax	12.4%	3%	1.9%	16.4%	66.3%
PBX	5.2%	1%	0.8%	17.9%	75.1%
Secure Web-server	15.7%	2.9%	1.6%	12.8%	67%
Videoconferencing	4.2%	3.6%	4.4%	17.8%	70%
Virtual Private Network	5.9%	1.9%	2%	17.9%	72.3%
Voice Mail	35.8%	4.6%	1.6%	9.4%	48.6%
Wide Area Network	7.2%	1.5%	1.9%	17.9%	71.5%
Wireless Network	7.2%	4.2%	3.0%	14.8%	50%

Table 2.2 Telecommunication Service Use
For 100% of Respondents

Respondents were then asked to rank the quality of services they subscribed to. Each service was ranked good, fair, poor or not available if the service was not offered in their area. The corresponding numbers in Table 2.3 are percentages based on how the respondents classified each service. Surprisingly, 57.1% percent of the respondents gave telephone service a GOOD rating and 27.3% gave it a FAIR rating. Similarly, 45.3% gave the Internet a GOOD rating and 27.7% a Fair rating, which is not surprising since 57.4% of the respondents use Dial-up services to access the Internet through their phone company, who received a high rating. Wireless service had the worst rating with 19.8% of respondents giving it a GOOD rating, 27.7% said it was FAIR, 13.5% said it was POOR and 5.2% claiming that no service was available. Since cellular service had a 62.3% use rate, this presents a problem for cellular companies who are statistically not providing satisfactory service to their customers. Until the region has a newfound demand for advanced services, local phone companies who offer limited communication services will maintain a good approval rate from business owners. Once businesses develop a greater need for broadband services such as T1-3 and DSL, providers will find it difficult to serve needs if new infrastructure is not built. As long as businesses are satisfied with basic services, new services will not be developed.

	Good	Fair	Poor	Not Available	Did Not Respond
Telephone	57.1%	27.3%	5.3%	0.3%	10%
Wireless	19.8%	23%	13.5%	5.2%	38.5%
Internet	45.2%	27.7%	5.9%	1.2%	20%

Table 2.3 Quality of Service
For 100% of Respondents

Respondents were also asked to decide how the availability of telecommunication services influences their decision to remain at their present location, or relocate. Of those surveyed, 59.3% said it would not influence their decision, 19.8% said it somewhat did and 10.4% said it was very important. Figure 2.3 illustrates the results.

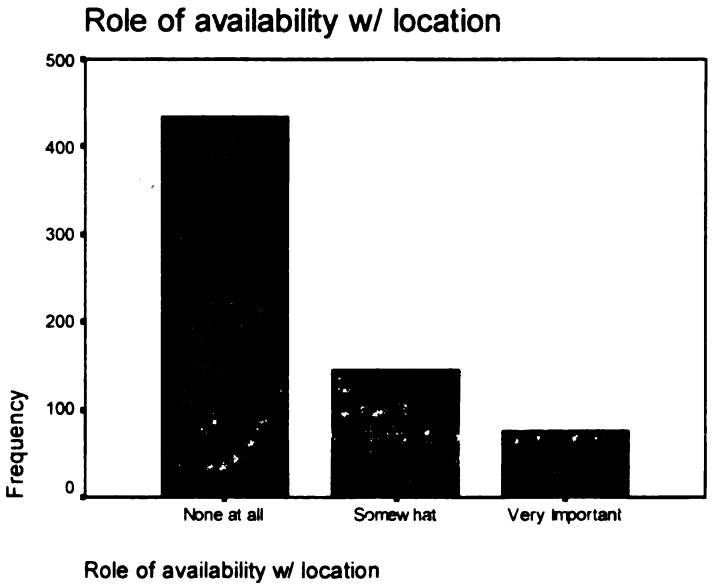

Figure 2.10 Role of Availability w/ Location

The fact that 30.2% of the respondents had some concern regarding telecommunication availability presents a large problem for the region. Businesses are becoming more and more dependent on advanced telecommunications to successfully operate a business. If upgraded services are not made more readily available, businesses will slowly leave and new businesses that spur economic development will not move or relocate into the area.

Finally, respondents were asked if they would be interested in telecommunication training by Michigan State University or other educational institutions to assist in telecommunication education for their business. Of the respondents, 25.3% said YES, 30.3% said NO and surprisingly, 34.2% said they were UNDECIDED. Figure 2.4 illustrates the results.

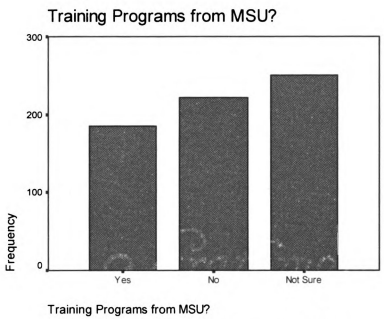

Figure 2.11 Training Programs from MSU

These results demonstrate an obvious uncertainty about the need for advanced services. Rural communities lack general knowledge about information technologies/services and could greatly benefit from training that would show the uses and benefits that are derived from such services. The percentage of businesses that were undecided must learn more about telecommunications and the training that can be made available to them. The percentage that was interested can be easily trained in new services and in turn help in the education of those that are limited in their knowledge of telecommunications and the information technology industry.

- **Residential Survey Results and Analysis**

The M-SITE residential survey[27] was developed to ascertain what telecommunication services were available to rural residents and to measure the user

[27] Please see Appendix p.105 for actual survey.

satisfaction of those services. A two-page residential survey was mailed to all eight counties in the region (Alcona, Alpena, Cheboygan, Otsego, Montmorency, Crawford, Oscoda and Presque Isle County). To randomize and fairly survey the population, exactly 23,000 surveys were distributed to all eight counties based on household population. M-SITE achieved a return rate of 21% or 4,865 usable surveys with a per-county return rate of ~20%. The gender of the respondents was equally divided with 50.2% male and 45.7% female.

The first question of the residential survey asked respondents to select telecommunication services they subscribe to from a provided list. As shown in table 2.4, the local telephone (90.9%), long distance (79.7%), and cellular usage (55.5%) statistics appear normal when compared to national levels.

	Use	Do Not Use
Local Telephone	**90.9%**	**9.1%**
Long Distance	**79.7%**	**20.3%**
Cellular	**55.5%**	**44.5%**
Broadcast Television	**38.6%**	**61.4%**
Cable Television	**37.6%**	**62.4%**
Satellite Television	**40%**	**60%**
Own Personal Computers	**61.9%**	**38.1%**
Internet Service	**57.4%**	**42.6%**

Table 2.4 Used Residential Services
Multiple Selections Possible per Respondent (Out of 100%)

According to the United States Telecom Association (USTA), 95.3% of households in 2002 had a telephone line[28]. As of December 2002, the USTA reported that there were 136.26 million cell phone users in the United States. With the current population around 295,787,655, that accounts for a 46% of the population. When compared to these statistics, Northern Michigan returned an average that was higher with 55.5% responding. Although, past on-site surveying by M-SITE revealed that counties that lie in the Northeast portion of the study area have much less cellular infrastructure and a lower usage rate. This unpredictable cellular use rate could be explained by consumer interest in using cellular service as a substitute for the expensive local and long distance land-line service that is available in the area. For example, long distance charges are usually exempt from cellular plans and are commonly included in your plan for free and deducted from your allotted monthly minutes.

Broadcast television usage was very low (38.6%), mainly because reception and content is limited due to a lack of infrastructure and television stations; many residents expressed that they do not receive more than 2 channels depending on their location. The geographic elevations in the studied area commonly present challenges for any kind of wireless communication technology.

Cable television has a fairly low usage rate (37.6%), and surprisingly, satellite television has a higher usage rate (40%) than both broadcast and cable television. This is mainly due to a non-existent broadcast network and poor cable availability, which leaves satellite television as the default source for television content.

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[28]United State Telecom Association. "Telecom Statistics". <http://www.usta.org/index.php?urh=home.news.telecom_stats>

The most surprising statistic was computer usage; 61.9% of those surveyed stated that they own personal computers. With our society's common interest in personal computing and Internet usage, it is no surprise that 57.4% of the respondents subscribe to Internet services to compliment computer ownership.

The second question explores what options residents had when obtaining Internet access services. Residents selected from pre-determined access options including a normal phone line, high-speed (DSL/Cable/Wireless) (~50% of respondents used Cable, ~25% used DSL and ~25% use wireless.), Satellite, Other Services or that they were unaware of options in their area; table 2.5 represents those results in percentages.

	Use	Do Not Use
Normal Phone Line	**73.7%**	**26.3%**
High Speed Data	**14.3%**	**85.7%**
Satellite	**13.1%**	**86.9%**
Other	**4%**	**96%**
Unaware of Options	**22.5%**	**77.5%**

Table 2.5 Internet Access Options Available
For 100% of Respondents

The technology most commonly used to access the Internet was standard telephone lines and signifies that most residents still depend on dial-up technology to access the Internet. Only 14.3% of the respondents use high-speed access and 13.1% use satellite to access the Internet. These statistics show that broadband still had a low penetration in the surveyed area and that satellite technology is not popular for accessing the Internet. Satellite technology typically has download speeds comparable to DSL and cable, but suffers from slow uploading rates. Most surprising is that 22.5% of respondents were

unaware of options to access the Internet. This can be explained in two ways: that there is an information gap between residents and providers or residents simply have no physical way to access the Internet and therefore can not obtain services.

The third question of the residential survey was included to ascertain opinions on broadband development in residential areas. If high-speed Internet access was not offered in their area, they were asked if it should be developed. 48% of respondents said YES, 4.8% said NO and 25.7% said THEY DID NOT KNOW. The obvious high demand signifies a need for improved broadband options. The FCC reported at the end of 2003, that high-speed lines had increased by 42% during the year[29]. Although, the respondents were not asked if they would actually subscribe to broadband services; the fact that 48% thought broadband should be developed portrays optimism that such services would be obtained. When compared to the national level of use, the studied rural area seems to be unusually similar in terms of broadband demand. The fact that so many residents did not know if it should be developed (25.7%), signifies an educational gap in terms of high-speed service uses and gratifications. One of the most important aspects of this question was to measure any negative responses from residents in terms of broadband deployment. During multiple spot studies in the areas, residents implied that by increasing technology development in rural areas, it would negatively influence the "rural" quality of life. More specifically, the natural atmosphere that coincides with rural environments would slowly fade. Surprisingly, only 4.8% of respondents thought broadband should not be developed. Alternatively, any negative response to advanced

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[29] Federal Communications Commission. "Federal Communications Commission Releases Data on High-Speed Services for Internet Access". 8 June 2004. <http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/hspd0604.pdf>

services from respondents may imply the belief that the average consumer will have minimal needs for advanced services. Despite such opinions, the results show that rural communities are indeed ready for upgraded services that are comparable to urban society. Given that 73.7% of respondents were either positive or undecided in regards to high-speed deployment is promising for rural communities that desperately need advanced telecommunication services.

Satisfaction statistics obtained from the residential survey revealed respondent opinions of the services they subscribe to. Respondents were asked to rate their services on a scale of 1 to 7, 1 being not adequate and 7 being exceptional. Figure 2.12 through 2.18 portray the ratings of each service.

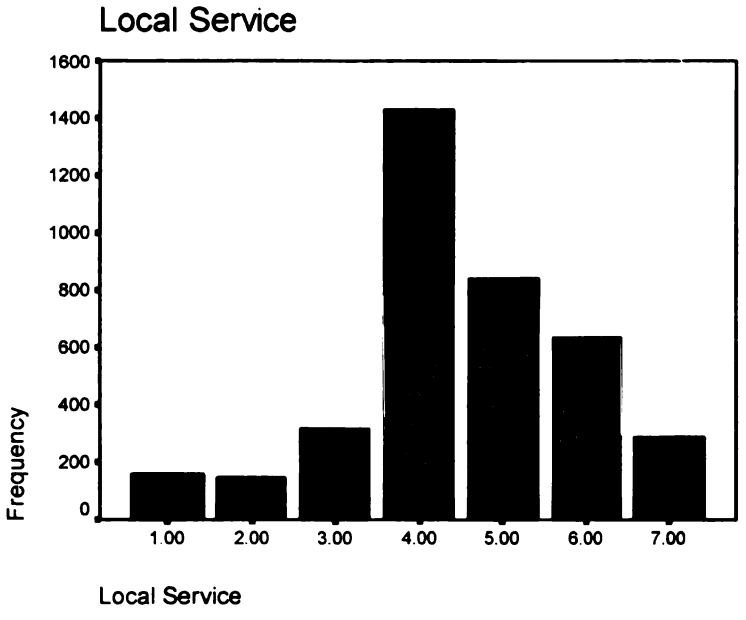

Figure 2.12 Local Service Ratings

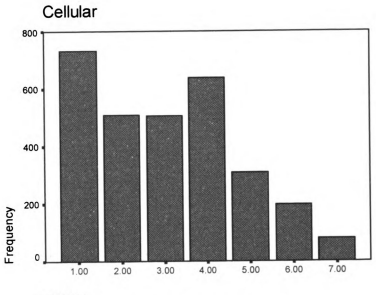

Figure 2.13 Cellular Ratings

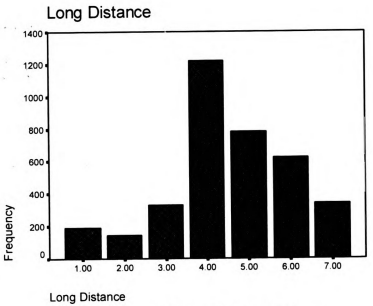

Figure 2.14 Long Distance Ratings

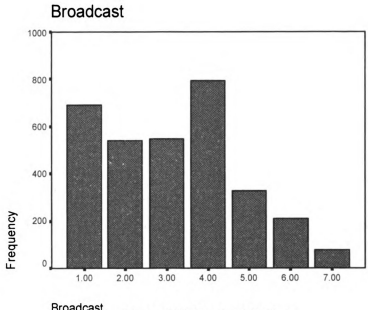

Figure 2.15 Broadcast Ratings

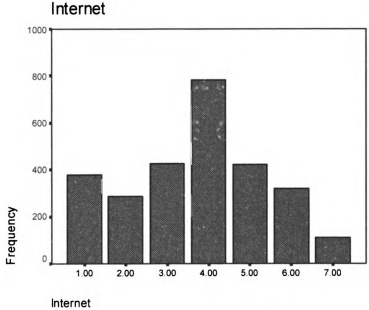

Figure 2.16 Internet Ratings

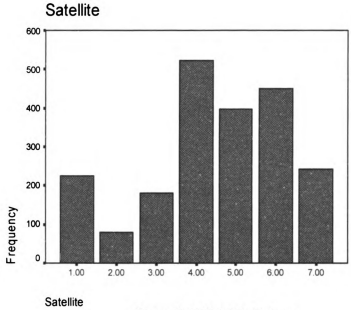

Figure 2.17 Satellite Ratings

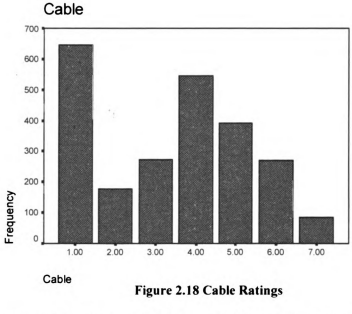

Figure 2.18 Cable Ratings

Local and long distance telephone service had a surprisingly low rating with an average of 4.5; therefore the incumbent exchange carrier in the surveyed area appears to be serving residents in an unsatisfactory way. If incumbent companies intend to offer broadband services in rural exchanges, their subscribers must be satisfied with their basic

services if they are expected to spend more of their disposable income on broadband services.

Cellular service received a very low average of 3, which is not surprising since cellular infrastructure development in the area is under developed. Most large cellular companies have scarce infrastructure in the studied area when compared to the rest of the Lower Peninsula. Such coverage gaps are illustrated in figure 2.12[30], with Nextel Communications coverage and Verizon coverage in figure 2.13[31]. Alltel Communications, who has recently monopolized coverage in the area by buying out Cellular One, blankets the area with coverage, but according to residents it is still not dependable in certain areas.

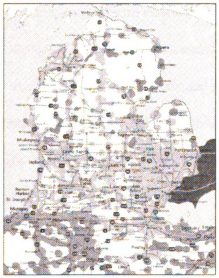

Figure 2.19 Nextel Coverage Map

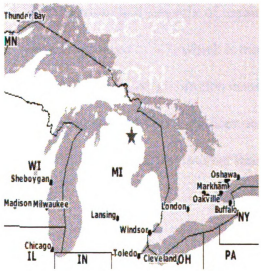

Figure 2.20 Verizon Coverage Map

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[30]Nextel Communications Cellular Coverage in Michigan. <http://nextelonline.nextel.com/NASApp/onlinestore/Action/RatePlanLanding?nextPage=RatePlanLanding&initstate=true&redirect=false&id4=shop_link2;rate_plans>

[31]Verizon Wireless Cellular Coverage in Michigan. <http://www.verizonwireless.com/b2c/CoverageLocatorController?requesttype=ZOOM%20LEVEL%20REGION>

Broadcast television also received a low score with an average rating of 3.1, which is also not surprising due to the same infrastructure under-development issues that cellular service has in the area. Cable television received a low average of 3.4 and suffers from the same infrastructure issues as cellular and broadcast television, but also faults when providing content to customers. Residents and businesses have continually complained that cable content is not satisfactory and are provided with a minimal choice of channels when compared to more populated areas. The most frustrating consumer issue discovered during on-site studies is that rural media providers may charge the same amount of money per month for basic content that urban companies charge for advanced content. Satellite services which may include television and Internet received an average score and may suffer from connectivity issues due to the elevated and low mix of terrain in the study area. Internet service also received a low average score of 3.7, which is most likely due to slow dial-up speeds and sporadic or slow wireless service; a common issue commonly expressed by residents in the area. Due to the low rating of both services and the difficulties in providing dependable wireless Internet coverage, the low Internet rating from consumers is no surprise.

3. Telecommunication Industry Interviews

To supplement research done by M-SITE in Northeast Michigan, extensive personal interviews were conducted with various representative governments and telecommunication providers that have specific ties with the telecommunication industry and telecommunication development in rural Michigan. Approximately thirty questions were asked in an open-ended format.[32] The information proved useful when analyzing advanced service implementation and will assist in the development of new strategies and policies to generate improvements in rural telecommunication development. The diversity in opinion and strategies of the respondents are important when trying to develop a thorough understanding of barriers, needs and goals in rural development. Out of (29) contacted individuals, approximately (5) government representatives and (8) providers were willing to participate in the interviews, each lasting no longer than one hour thirty minutes.

3.1 Representative Government Results

Due to the nature of the research, the following results are general summaries of personal interviews conducted by the researcher and were written to portray responses in a fair and thorough matter. At the time of the interview, the respondents were affiliated with multiple channels of the government, including state, local, and voluntary associations. Due to the close relationship each respondent had with the public, and the balanced outlook each possessed regarding the needs of both the public and the businesses in their communities, the data proved to be extremely useful.

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[32] Please see Appendix Section 7.4, p.111 for the interview questions.

- **What is Rural?**

The term "rural" coincides with many stereotypes such as farming, low income, low population, etc. These stereotypes can often influence opinions about telecommunications in rural areas; therefore, it was necessary to ask respondents what they thought constituted rural when describing it. In general, the respondents described rural areas as communities with low density populations that have different attitudes and value systems then urban areas. They also defined these areas as fishing and farming communities that are long distances from metropolitan areas. One respondent in the regulatory sector explained that they are commonly described as areas with less than fifty people per mile of telecommunication cabling; a point that commonly affects provider competition and infrastructure investment in rural communities.

- **The Need for Advanced Services**

Past debate has explored the need of advanced telecommunications in rural areas and if implemented, whether or not they would truly influence the development of rural communities. All respondents suggested that there is a need for advanced telecommunication development in rural communities. Diane Rekowski, director of the Northeast Michigan Council of Governments (NEMCOG) said that, "it is imperative that rural areas have the same competitive advantages for economic development as urban areas."

Another respondent explained that there have been multiple studies designed to explore such a notion, including a study from ex-Michigan Governor Blanchard's administration that revealed a need for improved infrastructure that will provide a government defined 200mbps service or IEEE defined 10mbps service to consumers.

It was also suggested that residents and businesses are learning of new services that are available in urban areas and are discovering that such services are not available in their areas. One respondent said, "Interests are changing, a large percentage of consumers now have computers and desire broadband services."
The respondent felt that rural users are becoming more aware that they can not obtain the new communication opportunities that urban areas are utilizing.

- **Implementation and Effect**

The general consensus of the study revealed that advanced services need to be developed, but more important are the possible effects the services would have on the communities. Most respondents thought that advanced services will have an overall positive effect on rural areas. More specifically, respondents mentioned that it would improve health care, education and job creation. Multiple respondents suggested that rural areas will be given access to the "global market" which will provide more employment and profit-making opportunities. It will give consumers who wish to live in rural settings the ability to "telecommute" to work and run their businesses without leaving their rural environment. Ron Choura of the Michigan Public Service Commission said, "People that like the rural quality of life, but have jobs that require high bandwidth such as engineers, advertisers and graphic artists can't stay, because the bandwidth is not available. If it was, they would be able to work from anywhere." Another respondent suggested that current rural services such as health care and schools will be able to increase the availability of new technologies and said, "Presently, those rural areas are not able to have access to advanced telecommunications and are at an economic and social disadvantage."

- **Take-Rate**

When advanced services are implemented in rural communities, telecommunication providers are commonly concerned about the take-rate of those services. When asked if advanced service use and technology acquisition would change if offered, most respondents expressed that advanced service and technology use would increase over time. Liz Fagel, Wide Area Network Administrator for Michigan Works! said, "I know people that have purchased a computer for the home, just for the explicit reason of being able to connect to the Internet. These were people that said they never needed or would use a home computer. They don't know how they lived without one all those years."

Some respondents emphasized that education and training would also play an important role in service demand. If the communities are continually educated about the services that are offered and what uses each one provides, many believe that the take-rate of such services will increase over time. Another respondent expressed a great deal of optimism and compared the situation to broadband and telephone take rates. He explained that telephone took 50 years to reach a penetration rate above 50%, and broadband has reached a penetration of 25-30% in only ten years. He also explained that the lack of penetration is a two part problem in that rural providers, "price high because they want a quick return. If prices were lower with a longer return, you would have a higher penetration.

However, some respondents were critical of service use increasing in rural areas. One respondent expressed concerns over the price of services and explained that people in rural areas are less able to pay for expensive services which are typically higher in

rural areas than in urban locations. A respondent said that, "there is a pricing dichotomy where prices are higher in rural areas with low take rates. Urban providers have more disposable income with a different take rate, because rural people can't afford the luxuries that urban people can."

- **Public Sector Needs**

The public sector has long implied that public services such as health care, public safety and education could greatly benefit from advanced telecommunication services. Respondents felt that if implemented correctly, advanced services will provide many benefits to rural healthcare, including: advanced testing, consulting, specialized services, diagnosis and even treatment. One respondent felt that, "urban healthcare will be helped in many ways. Telemedicine has changed the way paramedics do cardiac care, etc. by communicating with hospitals. New means of communication will save lives."
The respondent also explained that a "majority of healthcare in rural areas is volunteer. Training is slow and there are not enough people to spread costs around. Volunteers can learn remotely and video will allow patients to communicate with remote doctors." Although, one respondent who is positive abut the effects, felt that certain incentives will be needed to urge healthcare facilities to implement new solutions, otherwise a lack of funding and opportunity will prevent certain facilities from improving their technology.

All the respondents agreed that advanced services will enhance public safety. One respondent felt that 911 services are not adequate in some areas and could improve if advanced services are available. Others felt that collaboration between state, county and local organization would also improve. Diane Rekowski said, "Currently, there are rural areas with limited ability to contact emergency services. In addition, a greater

coordination between public safety providers could occur with advanced telecommunications. However, one respondent felt that resources could be an issue, with many rural public safety entities suffering from financial cut-backs.

All respondents agreed that rural schools could benefit from increased access to advanced services. They felt that online distance leaning could be extremely important to schools that have a limited curriculum. Ron Choura stated that, "(rural) schools can't afford teachers to teach a large amount of content with so few students. Distance learning will allow students to attend classes at home and give those with health issues a chance to learn."

Mr. Choura felt that teachers need to be educated about new technologies, and implemented for students in a user-friendly way. He also felt that new administrations have continually delayed attempts to improve technology in schools, which is something that must change if rural schools are to improve both their curriculum and opportunities to learn with advanced technologies.

- **Quality of Life**

Opinion generally differs when discussing advanced service implementation and the effects it may have on the quality of life in rural areas. Some feel that the serene and simpler way of life improves the quality of living, and others believe that a lack of urban-like functions in rural areas degrade the quality of life.

When asked if advanced services would affect the quality of rural life, most respondents felt that advanced services will improve the quality of life in rural areas. One respondent replied that possible improvements to public safety, computer systems and security services will improve police and fire protection and allow rural communities

to feel more protected. However, Mary Ann Heidemann, the Economic Development Director of Presque Isle County felt that in terms of the quality of life, businesses stand to gain the most from advanced services. She felt that people live in rural areas for a reason and already believe that such areas have a high quality of life. The measurement of quality in a person's life truly depends on the person judging the situation; however, most respondents thought that if telecommunications can improve certain aspects of the community such as education and public safety, than the quality of life in rural communities will surely improve. The general agreement that advanced services will enhance the quality of life may be due to the exposure or dependencies that the respondents had on telecommunication services. Although, most research has shown a general need for improved services and that need appears to be growing as more consumers become accustomed to advanced services.

- **Economic Development**

Most rural communities continually explore ways to enhance economic development, but telecommunication deficiencies continually restrain businesses and in some cases prevent them from moving into the communities. When asked if the implementation of advanced services would spur economic development, all the respondents thought that such services can assist with rural economic development, some even expressing that it was crucial to the idea. One respondent emphasized that in a world of global markets, businesses need to be able to communicate with short response times, have access to requests for proposals (RFP) and other tools attainable with advanced communications. He said, "Advanced telecommunications gives businesses an edge with increased competition, savings on land ownership and cheap labor rates."

Despite these benefits, the same respondent believes that growth must begin with the small businesses since large companies like IBM will rarely locate in a rural area. He suggested that rural communities must start new businesses and focus more on scientific or high-tech businesses that will attract more educated, scientific people. An increase in such companies will eventually attract "big" business and improve economic development.

- **Education and Demand**

The lack of demand for advanced services in rural areas may depend on the lack of education people have about those services. When asked if demand is dependent on education, all the respondents expressed that improved education will create more demand for advanced services. An emphasis was placed on education in schools and the need for more technologically advanced people to assist others in the education process. One respondent explained that, "consumers need to know how to use technology. The technological knowledge of parents, high school and college students will eventually trickle down through the generations."

This respondent felt that over time, as more consumers become educated, the general population will utilize more advanced applications and technologies. Although, in the respondents opinion, this can only occur if the schools improve their educational content and offer more hands-on learning with such technologies.

Another respondent felt the same way and expressed that the telecommunication providers are partly to blame in that, "consumers are confused about choices and they can't make their decisions. Providers will not educate customers and it is a big problem."

- **The Role of the Government**

As the penetration rate of broadband services has increased across the nation, there has been continual pressure on federal, state, and local governments to improve telecommunications in rural areas.

When asked about federal assistance, most respondents thought that the federal government had not done enough to support rural development and some respondents were not aware of any federal policies. One respondent thought that many policies had been established, but seem to be less effective since George Bush took office. He said, "Clinton expanded services with school and library grants, which did a lot for rural markets. Bush has stopped all payments and is now threatening expansion in rural markets."

The respondent also felt that the federal trend of promoting multiple networks in the same geographic space may not be the answer. He believed that the government has focused on big business in areas that have service and not the areas that need it. He said, "The federal government has done a lot for big business and not the small entrepreneurs."

Most respondents thought that the state government had not done enough to promote development in rural areas. They explained that despite current grants from entities such as the Michigan Broadband Authority and other funding opportunities, much more should be done. Some respondents explained that they were aware of state initiatives to improve rural services, but many threw money away with research and never achieved useful results. One respondent complained about the LinkMichigan Initiative and explained that most of the research was un-effective and the State seemed to disregard the entire process once the grant money had been distributed.

All respondents felt that local government had been ineffective, although some have been open to new ideas. Some implied that local governments are trying to find ways to aggregate new services in their communities, but many lack the education, funding, and initiative to follow through with the projects. A respondent stated that, "Local government has not done enough, but most are open to it. They need someone to lead that is receptive to new ideas. Unfortunately, expertise is lacking and some want change and others do not."

Some felt that inconsistent local policy tends to interfere with new development. A respondent said that, "some local ordinances could be an obstacle for some forms of advanced telecommunications, i.e. wireless."

It was also noted that if local communities desire to improve their services, they may need to step in and do it themselves. Ron Choura of the MPSC explained that, "without broadband, rural economic future is threatened. Consumers do not want to live in communities that do not have broadband. Communities such as Glasgow, Coldwater and Kalamazoo developed publicly ran utilities and it succeeded in attracting new businesses and residents."

- **Private Provision**

The respondents were asked a series of questions about the business viability of rural telecom providers. When asked about the state of rural economics and their ability to attract providers, most of the respondents felt that current market forces are not enough to attract new providers, although some did suggest that certain areas do. Additionally, most respondents said that rural providers do not obtain enough business to stay profitable and therefore do not upgrade their networks. One respondent said, "No, if they

did (obtain enough business), they would be willing to continue to upgrade their networks and services. They want to put their dollars where they can recoup the money fast, in order to start turning a profit."

Another respondent said that they can make money, "only if they are smart. If they have good operations, keep costs low, they can survive on the low population densities."

However, one respondent felt that all rural incumbent local exchange carriers (ILECs) make a substantial profit due to low fixed costs and a steady return on investment. The respondent felt that rural ILECs are not concerned with upgrades and make a steady income with current services.

An important issue for many of the respondents has been the continual lack of satisfactory services offered to rural subscribers by providers. Most respondents felt that rural providers do not serve the needs of their customers or only partially do so. One respondent said, "Service is not generally at a high level. The phones service is basic and the cable is horrible."

Another respondent had a different view and said, "If you look at the known 1,400 independent companies, one-half are cooperative companies. A co-op's main concern is the customer, where the large companies only care about profits, which results in dissatisfactory services. Co-ops invest in new technology, cable, Internet and all class services like long distance are generally free."

Unfortunately, the smaller providers who want to keep their subscribers satisfied are commonly limited by a lack of funding and resources.

- **Government Intervention vs. Provider Competition**

To explore the most effective ways to improve rural telecommunications, planners must decide who is responsible; the government or the providers. Multiple respondents said that it should not be totally up to the government, but different types of government incentives should be established. Liz Fagel of Michigan Works! said, "No, I think they should work with the local communities and help provide research, consulting, dollars and incentives for the local governments to spend some of the dollars in upgrading the rural areas."

Another respondent suggested that, "partnerships should exist, since the market is against rural areas. The market needs government incentives to make it more active."

Ron Choura of the MPSC suggested that, "income redistribution needs to be prevented. Local government should create policies that do not take away disposable income. Governments should encourage uniform ubiquitous networks that serve the needs of consumers."

He also suggested that, "local government should put in infrastructure in right of way (ROW) such as conduit in sidewalks that can accommodate gas, electric and telephone simultaneously."

Responses were also mixed when respondents were asked about the responsibility of both the providers and the private sector to drive competition. One respondent said, "Yes, (the private sector should be responsible) but also offer incentives like tax breaks or dollars for the private sector to come into the rural areas and to make the initial investment."

Others felt that the rural markets will never be competitive enough for private sector development since most communities are low income with low population densities. Another respondent explained that, "for the first fifty years, private sector did not invest in rural markets. If it wasn't for grants, low-cost loans and government imposed system standards, rural markets would have never been developed."

He also explained that large phone companies will always give their profits back to the stockholders and try to maximize profits with the shortest return. They do not look out for the best interest of the customer. One respondent questioned government strategies and claimed that "market forces are not the answer. Why not build six roads along side of each other similarly to the way governments suggest six phone companies to promote competition; it just doesn't make sense."

Despite some optimism, most respondents felt that competition will never be enough to improve services in rural communities. The lack of population, sluggish economy and absence of planning are simply too much of a deterrent for multiple providers.

- **Relevance of Cost**

The cost of advanced services is typically a great concern for consumers in rural communities. When asked about the relevance of cost, all the respondents thought that the price of services was critical and that it must be affordable for consumers in rural areas. Diane Rekowski said, "Cost is very important, since much of the region is economically distressed with limited incomes."

Another respondent felt that it is the biggest problem, since residents can not afford the multiple expenses they incur from telecommunication providers. He said, "If providers want to increase competition, the price must be affordable."

One respondent felt that higher prices for low income people are not right. If the situation is too bad, he felt that regulation may need to be implemented to control it.

Since service costs are a relevant issue for rural consumers, providers tend to create frustration for them when they are forced to charge higher than normal prices for similar services in urban areas. A lack of subscribers per outside plant, high taxes and operational costs tend to drive the prices of such services up. When the respondents were asked to address this issue, most felt that rural companies need to charge higher than normal prices to stay profitable. Others felt that they did not have a right since the income level of their customers is so low. One respondent said, "They have to, but that is where government comes in. They need to offer incentives to control the prices." Another said, "No, that is what is happening here. In my opinion it is a monopoly." It appears that most respondents understood that rural providers need to charge higher than normal prices, but emphasize the fact that consumers in such areas can not afford it. They all expressed that something must be done to subsidize or lower prices, so that rural consumers can utilize the same services that urban consumers have become accustomed to using.

- **The Digital Divide**

Demographic differences such as age, education, income, geographic location and race can influence what technologies and telecommunication services consumers typically utilize; this is commonly know as the digital divide. When asked if the digital divide was apparent in their community, all of the respondents said that there was a digital divide in their area, however some said they can see the gap closing as people become more aware about technology. Most respondents thought the divide would affect

education, business opportunities, and the overall knowledge base of rural society. One respondent explained that he thought the divide was worsening. He said, "Urban areas tend to have more options and when rural areas get options, they are not the same quality. Rural can not keep pace with urban markets."

Liz Fagel of Michigan Works! explained her opinion of the division and said,

> "You always will have the people who do not want to use technology. These are usually the people that are negative about life in general. I think that those people would be on the wrong side of the divide, whether they live in rural America or in the big city. I just see them affecting the attitudes towards technology of some people. They don't trust the technology."

Most of the respondents thought the divide was worsening, but a few thought it was improving. One respondent who thought it was the same said, "Our problems are not addressed quickly enough so the problem is still there."

Another respondent said, "It is getting worse. We are losing pace with society and Michigan is not doing enough to improve rural areas."

- **The Past, Present and Plans for the Future**

When asked about past attempts to improve telecommunications in their community, the respondents responded with a number of different solutions to either attract or improve telecommunications in rural areas. Liz Fagel of Michigan Works! Explained that she pressured their local phone company to upgrade their network, which resulted in upgrades for the local ambulance, fire and police stations. She explained that, "my husband and I have worked to try to get the city to install fiber while they were installing the sewer system. It didn't work, but they did lay conduit for future use."

She also explained how the Northeast MI Consortium and the Michigan library, worked to bring the first local dial-up access to several communities in the Northeast Michigan area. Another respondent, Mary Anne Heidemann explained that, "our efforts in Presque Isle have not worked too well. The telephone company is usually not helpful and providers in general are secretive, competitive and do not cooperate."

Ron Choura of the MPSC explained that the commission helps whenever possible. He said, "We execute interconnection agreements, broadband studies and solve complaints (a lot in rural areas)."

The respondent is also adjunct faculty at Michigan State University and works with students to conduct research and find ways to provide low-cost services to rural areas. Another respondent, who is an active economic planner in his village, explained that the community has continually pressured wireless internet providers to add towers to serve their schools and other areas, however, the efforts proved unsuccessful. He also explained that his village had considered constructing their own fiber ring, which proved unsuccessful due to the projects expensive nature.

When asked about current or future projects to improve rural telecommunications, all the respondents expressed that they did not have any current projects, but are continually looking for new opportunities to bring advanced services to their areas. Some ideas included new grants and the possibility of wiring locations with the help of start-up providers that are building in new locations.

The fact that most have no current or future plans to push for new services is a worrisome fact. It appears that past attempts have possibly discouraged local governments from new planning and they have simply abandoned the idea. Something

must be done to inspire the local governments to aggregate new services and it should not only come from them, but from the state, the federal government, and even the providers who have continually ignored the needs of rural consumers.

Finally, respondents were asked to conclude their interview with any alternate ideas that they may have and were not mentioned during the interview. Most respondents refrained from continuing, although a few respondents did have comments. One respondent said,

> "I just try to keep people educated on what is happening within the technological community. I encourage them to call, write letters, etc. to the local government, state and federal with their complaints of no or very little services. If they are negative, I try to educate them about the good and bad of technology. I wish I had a magic answer for this one."

Another respondent also stressed the importance of education, information workshops, seminars and other ways to improve the local citizenry's and government's understanding of new technologies.

Finally, one respondent said, "we need to get entrepreneurial people with information technology knowledge to reside in rural areas. We currently have few of the creative class and they will be the engines to force change."

-End of data.-[33]

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[33] Please see section 3.3 for concluding remarks about both the public sector and provider data.

3.2 Service Provider Results

Due to the nature of the research, the following results are general summaries of personal interviews conducted by the researcher and are presented in the order stated above. The results were written to best overview the responses in a fair and thorough matter. These interviews offered useful views from the providers who are trying to serve rural areas and revealed reasons behind the lack of expansion in rural communities.

- **What is Rural?**

The term "rural" coincides with many stereotypes such as farming, low income, low population, etc. These stereotypes can often influence opinions about telecommunications in rural areas; therefore, it was necessary to ask respondents what they thought constituted rural when describing it. Surveyed providers generally classified "rural America" as small communities with one or two telecommunication providers with less than 15 customers per square mile of built infrastructure. They also classified rural areas as communities with low populations, slow economies, and poor educational opportunities. The distance from metropolitan areas also played a factor when considering how "rural" a community was. Charles Scott, owner of Gas Light Media, said, "from a technology perspective, rural America is not so much about how many people, but more about how well technology is integrated into the fabric of society and business."

He also said, "I don't necessarily consider being socially rural a bad thing, but do consider being technologically rural as a problem."

- **The Need for Advanced Services**

Past debate has explored the need of advanced telecommunications in rural areas and if implemented, whether or not they would truly influence the development of rural communities. All the providers interviewed expressed a need for advanced telecommunication development in rural America and many believe that such services will enhance rural communities. Cayce Will of DeepNet Communications, LLC a rural ISP in Michigan, believes that rural areas need more development, but for different reasons than the urban settings that rural areas are continually trying to simulate. Cayce said, "I just can't see the local farmers on their tractors checking their stock with a Blackberry, but I can see them checking milk prices on the wholesale market." Chris Natzel, General Manager of a rural Internet Service Provider agreed that there is a need for advanced services, but explained that it is difficult. He said, "Considering the nature of the free market economy, it only makes sense that the traditional broadband service providers are reluctant to develop rural markets. The government needs to continue to allow incentives and funding to encourage broadband development in rural markets."

When asked about an increase in observed interest for advanced services in their communities, all the respondents stated that they have observed a definite increase by rural consumers; more specifically broadband Internet, improved voice services, voicemail, VOIP, video and security systems. Paul Hartman, General Manager of Allband Communications believes that since the speed of data transfer is continually increased, consumers tend to desire it, which creates pressure on the companies responsible for infrastructure development. He said, "The customers seem to be pushing

the "infrastructure" companies, rather than the other way around, per normal market theories."

- **Implementation and Effect**

The general consensus of the provider study revealed that advanced services need to be developed, but more important are the possible effects the services would have on the communities. The general opinion was that implementing advanced services will have a positive affect on rural society and essentially equate rural and urban areas in terms of the opportunities that are available via advanced services. The providers felt that advanced services would attract professionals and businesses, allow people to work from home and disperse jobs into less populated areas; an important case for families who need urban services, but desire to live in a rural settings. Paul Hartman believed that advanced services will eventually become a new tool for rural society and such services "will indeed be used and what is defined as "advanced" will become required tomorrow." Others providers felt that introducing new services is important for the economics of the industry; having a choice of services provides competition and keeps prices low enough to keep customers satisfied. Another respondent expressed the positive effects broadband services will have on rural businesses, in that they will provide new 'business to business' and 'business to consumer' transactions that are typically not seen by larger companies and traditional "mom and pop" businesses in rural communities.
A different provider explained that, "it will allow rural businesses the ability to compete with their metropolitan counterparts, which means they can employ more people and better pay will create a more sound tax base for the federal, state, and local governments."

Another provider explained that, "the net mix of more affluent residents and low-impact technology dependent businesses would provide a much stronger support structure to community services, education, occupation, and social opportunities with a resulting trickle-down effect to all residents, regardless of their use of technology."

- **Take-Rate**

When advanced services are implemented in rural communities, telecommunication providers are commonly concerned about the take-rate of those services. Providers felt that once introduced, advanced service acquisition and technology use would increase. Although, most felt that it will be a challenge due to the low number of potential customers and those traditional rural residents that have no interest in the benefits of advanced services. However, some providers felt that once the services are implemented, the non-users will eventually see the advantage of such services. Other providers suggested that acquisition will depend on the wealthy paying higher prices for advanced services, with the rest of the community waiting for service prices to level off. One provider explained that, "it will be difficult to deploy such services to many rural communities without either consolidating that demand with commercial users, schools, and public organizations or if that's not adequate, without subsidies. The question is how to make services available in an environment where subsidies are less likely."

- **Public Sector Needs**

The public sector has long expressed that public services such as health care, public safety and education could greatly benefit from advanced telecommunication

services. When asked about rural healthcare, provider opinion varied. Some thought that current services adequately serve the needs of rural healthcare facilities, while others thought that implementing advanced services will cause operational confusion, raise taxes, and create new fees. Those that support the idea thought that implementing advanced services will give healthcare facilities a wide range of new tools including remote ambulance communication, video monitoring, and remote communications with other facilities. A provider said, "Broadband availability would allow rural health care practitioners to transfer critical data to specialists at advanced health care facilities for timely consultation."

Another provider thought that rural healthcare will take a new direction with the addition of advanced services. They explained that new automation, electronic data storage and the transfer of medical files will allow health information to be distributed better. However, one provider was skeptical and said, "At this time, other than simply for information gathering, there does not appear to be any significant application for such communications between residential users and those health providers."

Most of the providers surveyed believed that advanced services will enhance public safety. It was suggested that video access on customer premises will be useful for remote monitoring by customers and public safety institutions such as the police and fire departments. A provider said, "Law enforcement officials would have better and faster access to national and state databases of past offenders. Also, law enforcement officials could then use video monitoring equipment to capture data live at a crime scene or traffic stop."

However, some providers thought that public service entities lack the "engineering spirit" to implement new uses. They believe that the cost of training, maintenance and taxes to maintain the system are too costly to implement. One provider felt that the "911 system seems to be ok" and the influence advanced services will have on public safety "depends on the situation."

Another provider explained that, "this requires the public safety sector to take the initiative of placing useful information on-line in a useable format and being available to respond to communications in a timely manner. This may be asking a bit much for rural public safety organizations that are minimally staffed and often volunteer or part-time.

Like public safety and healthcare, providers generally felt that advanced telecommunications will enhance rural education. However, some felt that a lack of funding will continually diminish the ability of rural governments to improve education with technology. Despite these concerns, the majority of providers interviewed felt that advanced services will enhance education with the addition of distance learning and will offer new curriculum for students and the adult population. One Michigan provider felt that since most colleges are publicly funded, its educational content should be available to all areas of the state including rural schools. Another provider felt that, "without a similar level of enhanced services, the educational opportunities at rural schools is certainly going to be more limited than most urban schools."

- **Quality of Life**

Opinion generally differs when discussing advanced service implementation and the effects it may have on the quality of life in rural areas. Some feel that the serene and

simpler way of life improves the quality of living, and others believe that a lack of urban-like functions in rural areas degrade the quality of life.

Most of the providers surveyed felt that advanced services will improve the rural quality of life, but it depends on the person or business and how he/she interprets the effect. A respondent said, "By improving their education and employment opportunities, you also improve their income level and standard of living."

One provider emphasized that advances in health care and education due to advanced services will enhance the rural quality of life, while another provider explained that the way rural residents use advanced services depends on the ease and use of the technology and how relevant it is. However, Cayce Will of Deepnet Communications believed that new technologies give rural residents the ability to be more reclusive and are problematic. Cayce said, "I can count no less then three divorces within the ranks of my dial-up customers caused by computers and their inappropriate use."

Another provider said, "It seems that the tricky part of bringing advanced services to rural areas is to do so in a way that doesn't tread on the real benefits of rural life, but instead enhances it in more subtle ways."

- **Economic Development**

Most rural communities continually explore ways to enhance economic development, but telecommunication deficiencies continually restrain businesses and in some cases prevent them from moving into the communities. All responding providers felt that advanced services will assist with economic development in rural areas. One provider emphasized that almost all businesses need telecommunication services and almost all can benefit from them. If a business has a choice, most will always operate in

a community with advanced services. However, another provider noted that entrepreneurs will more than likely be the driving force, although the difference is that they will focus on personal economic development and not the publics'. A representative of LDMI Communications is positive that economic development will improve and said, "where you choose to operate does not matter anymore, the click and mortar model will aid businesses in customer acquisition."

Another provider said, "Many businesses, I believe would actually prefer to be in rural areas if it were not for distance. Rural communities offer cheaper labor, cheaper taxes, cheaper real estates, etc."

- **Education and Demand**

The lack of demand for advanced services in rural areas may depend on the lack of education people have about those services. All interviewed providers felt that education will create demand for advanced services. One provider said, "I suspect the majority of the education will come from the private markets, but some small quantity will be from public entities."

A different provider emphasized the need to visit schools, businesses, nursing homes, and other locations to successfully market available services and its complimenting uses. Another respondent explained that rural areas will more than likely follow the trends of the early pioneers or early adopters and a "pulling effect" will force consumers to adapt to new services over time.

- **The Role of the Government**

As the penetration rate of broadband services has increased across the nation, there has been continual pressure on federal, state, and local governments to improve telecommunications in rural areas

The majority of the providers felt that the federal government, state and local governments have not sufficiently promoted advanced telecommunication development in rural areas. However some believe that federal programs such as the Universal Service Fund (USF) have been successful and others feel that the program has become increasingly plagued with problems and its growth may cause the fund to be reviewed.

Other concerns were expressed about state grant programs and their effectiveness. Paul Hartman of Allband Communications Cooperative said, "From what I have seen of state grant programs, at least some of them seem to miss the mark. Someone has to have a vision – specific vision as to deliverables. Throwing money with a name attached to it is not enough."

Likewise, another provider feels that, "the rules and requirements of state provided loans and grants tend to be counter effective and in the end the process is not worth it."

The company felt that the grant and loan offering institutions are too concerned with job growth and return on investment, when they should be concerned with the telecommunication expansion the grants and loans are intended for. Another provider agreed and said, "Michigan has probably done a better job than most states, but I can tell you for a fact that the financing terms (from state loans) are ridiculous but I do believe that the state is better suited than the federal government to come up with programs to encourage development of broadband services in rural areas."

It was also said that, "frankly, the state doesn't understand rural broadband deployment, nor provide aggressive enough, or compliant enough options to enable comprehensive solutions to rural needs."

Most providers thought that local governments do not do enough and "seem oblivious to both the needs for advanced telecommunication and ways to make it happen."

It was also suggested that local governments are not presented with feasible solutions and are rarely pressured to find solutions for the lack of services. One provider made an interesting point that, "in many cases (local governments) may avoid technology issues as they are seemingly contrary to their perspective of rural life."

- **Private Provision**

The respondents were asked a series of questions about the business viability of rural telecom providers. The respondents had mixed feelings regarding the amount of business needed to sustain a successful operation. The general opinion is that not all areas provide enough business and most providers barely obtain enough customers to stay operational. While one provider felt that current government subsidies are enough to remain successful, others felt that the company's business models are the key to success. It was felt that the unique relationship rural companies hold with their customers, combined with the continual introduction of new services and benefits will provide a steady revenue stream. Another provider pointed out that "rural providers operate on a smaller scale and despite small growth, rural companies can become very profitable once their initial investment is returned."

A different provider said that it depended on the area, but "one thing that must be avoided is dilution of demand. Seemingly rational initiatives, like building connectivity solutions specific to the public sector that do not also directly support all other private sector consumers with services of adequate reliability and quality, severely dilute the available business volume to providers."

The respondents generally said that providers do not adequately serve the needs of rural consumers, but some said it depends on the area and the economics of the industry. One provider believed that a lack of choice is a key issue, while another respondent emphasized that in the consumer's mind, providers do not serve their needs, and although recognized, the economics of the rural industry prevent improved services. It was explained that the situation is a matter of "paternalistic" tendencies, where a rural provider may not offer new services simply because they believe it is not needed, despite signs of demand. The same respondent also acknowledged that there are providers in rural areas that have implemented advanced services in the same conditions, which signifies a direct dependency on the individuals in the companies who make the decisions. However, one respondent believes providers do serve their needs and although most can not obtain high-speed broadband, the advancements in high-speed dial-up may supplement the lack of traditional broadband services. Charles Scott thought that a "multi-tiered distribution and support approach may be best for rural areas. This not only provides a better level of service to rural customers, but also results in better distribution of experience, knowledge, and opportunity and should be a specific objective of any comprehensive initiative."

- **Government Intervention vs. Provider Competition**

To explore the most effective ways to improve rural telecommunications, planners must decide who is responsible; the government or the providers. Most of the providers surveyed believed that rural development should be the responsibly of the government. Some believe that it is the responsibility of the government to provide reliable communications to all its citizens and improve the quality of life. Charles Scott explained that,

> "Local, regional, and State government need to develop plans that result in short-term aggregation of demand between public and private sector consumers of services adequate to make deployment possible. In very rural settings, it may be necessary for government to actually participate in the process as utility, support local co-ops, and to engage in selective participation with providers to ensure that services are available."

He also thought that there should be a weighted cooperation and more of an emphasis on deriving competition.

However, several providers disagreed believing that such policies will lead to subsidies, false price points, and inequalities in competition. Both thought that the free market system would work in time. One felt that the market forces are there, but at the moment, the telecommunication industry is too concerned with a fast return and the patience needed to succeed in a rural market is non-existent.

Several providers said that rural development should have some dependence on the private sector and competition for development. One provider felt that if people desired rural development they should have to pay for it. Another said that it is a good

idea, but current incentives such as USF and rate of return regulation have not been enough to supplement the lack of demand that providers encounter in rural communities. Other providers interviewed felt that there was a lack of positive effects and that traditional market forces are not enough to attract private telecommunication providers to rural locations. One provider thought that competition is not effective and said, "This may sound counter-intuitive, but competition is actually counter-productive in rural areas. Expecting private sector initiative in those areas is not realistic. This does not mean that the private sector shouldn't be involved, to the contrary, the private sector can be encouraged to participate with the right public sector processes to create aggregated demand."

- **Relevance of Cost**

The costs of advanced services are typically a great concern for consumers in rural communities. When asked about the cost of services, the respondents expressed that it is one of the most important issues regarding rural development. One respondent believed that prices must be competitive, but attainable by the lowest income families. Another respondent said that costs are highly dependable on perceived value, meaning that the higher the perceived value, the higher the odds the consumer will be willing to pay for it. The method of payment is also important, in that flat rate versus measured rated can influence the obtainment of services. A representative of LDMI communications felt that, "cost is very important. Companies should offer improved services, but if the cost is too high, the company will be fighting an uphill battle in their efforts to get market penetration."

Another provider said, "We did an extensive market survey before going to market and we discovered that broadband service needs to be priced at less than $40 per month to have a take rate that would support the endeavor. The survey also clearly showed us that the biggest obstacle for getting broadband for the customer is up front cost."

Since service costs are a relevant issue for rural consumers, providers tend to struggle when they are forced to charge higher than normal prices for the same services in urban areas. A lack of subscribers per outside plant, high taxes and operational costs tend to drive the prices of such services up. Provider opinion of this question was relatively mixed. Some thought that since rural areas have lower populations, higher rates should be charged to balance the costs. While some respondents said that providers do not have the right to charge higher prices. One provider thought that companies should have the ability to charge higher prices and felt that if the saturation of the population is low, prices must be higher to achieve a return even if the consumers can't afford it. One respondent felt that rural areas are not always the most expensive places to serve and said,

> "Since serving rural (areas) will not make the Wall Street Journal, some companies seem to feel that a tribute needs to be paid for the inconvenience of serving rural areas. The case can be made that rural areas are the best earning areas – low cost to serve, limited, if any competition, etc; just steady unspectacular revenues."

Another rural provider said,

> "Suggesting that rural technology costs should be lower based on demographics is misguided unless there is a reasonable expectation of subsidies. Clearly

providers are entitled to a reasonable profit. Any approach that does not accept that as a pretext is bound for failure. Having said that, I do believe there are ways to reduce the costs through more aggressive aggregation, community participation, and even cooperative service delivery."

- **The Digital Divide**

Demographic differences such as age, education, income, geographic location and race can influence what technologies and telecommunication services consumers typically utilize; this is commonly know as the digital divide. Most respondents felt that a digital divide did exist in their locations. Others see a slight effect, although some believe that it is greater in more populated areas. One provider responded that, "age is a main factor where areas are really just a retirement community and the elderly have fixed incomes and lower tolerance for change. They stick with their dial-up because they don't want to lean about broadband, and it is typically more expensive."
Another provider thought that the divide is due to availability and not necessarily demographics. He said, "While a digital divide does exist in our area, it should be seen as a result of availability and familiarity only and not demographics as suggested in the question."

Those that saw a digital divide in their communities felt that income was a significant factor, with the wealthy desiring all services and those with less income housing the same desire, but unable to obtain it. Older citizens were also suggested since most have no need for advanced services, but feel that those demands will change once the baby boomers reach an older age. Another respondent suggested that it slows economic development, decreases educational opportunities, and segregates the society.

A different respondent suggested that the digital divide is not just a problem in rural areas but inner-city locations as well. The respondent said, "What is interesting is that the digital divide is both a rural and inner city issue. While rural gets most of the attention, it is equally a problem for the inner cities. If rural and inner city ever figure out that they are in the same boat, so to speak, they could be very potent politically. So far they can not even seem to see each other."

Respondent opinion was mixed when asked about changes in the digital divide. One provider thought that the rural divide was worsening in rural areas and said, "The digital demarcation point as marked 5 years ago, e.g., 14.4 kbps is getting better. However, if the digital divide demarcation point is fluid, I am not sure that rural (and inner city) is even holding its own."

However, some providers felt that it is improving and counts on the unification of services to solve rural difficulties. The respondent said, "It will improve as the mode in which people connect to the digital technologies glom together and become unified. There will be less of a difference in connection rates and availabilities so that being "connected" will be ubiquitous."

One provider explained his theory that technology is like an explosion and said,

> "It will take an infinite amount of time for it to be spread evenly to all areas. In that time, it's likely there will be a repeating sequence of technology explosions that restart the process over and over – many in the same location, some elsewhere. Without an infinite amount of energy applied to the problem, there will always be some kind of digital divide, and there probably should be. As

such, I only see our present state as part of the cycle. That cycle is not likely to change in the future but is also not an excuse to avoid participation."

- **The Past, Present and Plans for the Future**

When asked about past and present attempts to improve rural telecommunications, the respondents expressed multiple ideas. Most providers cited the past expansion of networks to rural areas and more specifically wireless services that have suffered technological and interference difficulties. A rural provider explained that, "I've experienced frustration time and time again. In some cases this is the result of simple technical problems with incumbent carriers that could be overcome if there was actually a desire to do so, and would in fact be to their advantage. In general though, the biggest problem has been achieving adequate aggregated demand in a sufficiently short enough time period to make deployment possible."

The provider's future plans appeared to be more promising. One respondent acknowledged attempts to expand exchange areas to serve un-served locations and another is beginning construction of a new company to serve un-served areas, with a large emphasis on the development of education. One respondent stated that they continually review new applications for service to develop ways to reach rural customers and another intends to construct a "template" that can be used to replicate development solutions in all rural areas. A different provider that does not typically serve rural areas is currently planning to offer services in less populated areas. Finally, another rural provider explained that they are trying to partner with other local providers that will cooperate with technology and service deployment. The provider said, "We're working

on creative means to aggregate demand through the development of local cooperative initiatives to reduce the cost of deployment into those communities."

Most of the respondents refrained from suggesting new ideas; however, one provider emphasized the need to get rural youth involved in their communities. They explained that the youth can be taught how the telecommunication market works and will address ways to make such endeavors financially successful. Despite this idea, the respondent said, "Unfortunately the stereotypes taught in schools regarding rural and inner cities will not encourage emphasis on these issues. More precisely, since the rural and inner cities do not fit the taught stereotype, they are ignored."

Another respondent who has been involved with a non-profit telecommunications cooperative felt that more companies that are non-profit should be developed to serve telecommunication deficient areas, which will in turn avoid the economic draw-backs that prevent competitive companies from implementing advanced services in rural areas.

3.3 Data Summary

- **Implementation and Need**

Rural providers and government respondents had very similar responses. Both thought that advanced telecommunication development was needed in rural areas and that the introduction of such services would have a positive effect on rural communities. Each group had seen a significant increase in demand for better services and both believed that the high saturation of advanced services in urban areas have created a technological dependency that has slowly spread to rural locations.

- **Take-Rate and Demand**

Both groups were optimistic about an increase in demand for advanced services and thought take-rates would also increase over time, although, both expressed similar concerns. Government respondents were mainly concerned about the price of services and how much money low-income consumers can afford to pay for them. Providers understood the pricing issues, but most acknowledged that prices may need to be higher than normal until subscription rates are high enough to level off the pricing, otherwise providers can not recoup investment costs.

- **Public Services**

Rural areas are typically associated with under-funded public entities, which result in poor safety, educational and health services. Both groups agreed that the implementation of advanced services would enhance these services. The providers, although positive, had multiple concerns about the use of advanced services in the public domain. Many providers believe that trying to enhance public services will create confusion, higher taxes and diminish the ability to improve them due to a lack of knowledge and seriousness to follow through with the changes.

- **Quality of Life**

The quality of life in rural areas is an issue that is seen in different ways. Most think that a lack of advanced services in rural areas diminish the quality of life, while others see the tranquil characteristics of the rural society more enjoyable. Both groups agreed that by implementing advanced services, the quality of life will increase, although both acknowledged that it was really a matter of opinion. While some respondents in

both groups saw it as a possible problem for rural people, most associated the benefits with an improvement in education, health, and safety; which all have a major influence on the quality of living.

- **Economic Development**

Both groups agreed that economic development is critical for rural communities and also agreed that the implementation of advanced services is crucial to drive rural economies. Most respondents thought that it was important for rural businesses to have access to the global market and to have the opportunity to telecommute from their homes. The "click and mortar" business model is become increasingly important for businesses to remain profitable, and rural businesses are not able to participate in the online market. Most agreed that rural communities are attractive places to operate due to low wage workers, cheap property, and low taxes. Despite these benefits, businesses tend to locate in more technologically equipped locations, which rural communities can not typically provide.

- **Education and Demand**

Education plays an important role in the marketing and use of products. Both groups said that in increase in educational opportunities about advanced services will gradually create more demand for the services. Government respondents concentrated more on technological education in schools, while the providers suggested that it is may be up to the private market to sell their services and in turn educate their customers about them.

- **The Role of the Government**

Both groups were generally not satisfied with federal, state, and local assistance. Aside from programs such as the Universal Service Fund (USF), neither group suggested that the federal government had done anything with impact and many of the providers were concerned about the USF and its future availability. Both groups mentioned state initiatives, although both mentioned that they had been mainly ineffective. Their general opinion was that state programs tend to throw money at problems, but generally do not follow through with solutions that have any real effect on the communities. Out of the three levels of government, the groups were most pleased with local government initiatives, but both suggested that the local governments do not know enough about telecommunication development and lack the incentive or resources to follow through with their initiatives.

- **Rural Provision**

The success of rural providers is typically imbalanced with few turning a profit and most are unable to upgrade services due to a lack of revenue return. Both groups agreed that most, but not all providers obtain enough business to remain consistently profitable. It has been a hope by many economic planners in rural communities that competition would eventually force rural providers to upgrade their services, but unfortunately this has not happened and both groups surveyed felt that current market forces are not enough to attract new providers to rural areas. Additionally, both groups also agreed that rural providers do not provide satisfactory services to their customers. Aside from a few respondents, most explained that it is not entirely the fault of the providers due to a lack of subscribers and demand. Aside from cooperative companies

who have more subsidies, most respondents believe that competitive rural providers typically can not offer advanced services with their current revenue streams. Unfortunately, some respondents did blame certain providers, such as incumbent exchange carriers who typically ignore the needs of rural consumers and do not upgrade networks due to already profitable revenues.

- **Government Intervention vs. Private Competition**

Unsurprising, the government respondents thought that rural telecommunication should be the responsibility of the private sector and most providers believed it should be the responsibility of the government to spur development. Despite the difference, both agreed that certain incentives and subsidies must be established to offset the high costs and low revenues in rural areas. It is apparent that most local governments do not have the resources or desire to implement government operated provision and the current providers continue to struggle with day to day operations. As both groups suggested, it would seem that the only solution that remains are strategic initiatives to aggregate demand and provide financial relief for providers so network and infrastructure upgrades can be built.

- **Relevance of Cost**

Both groups agreed that the cost of advanced services is one of the most critical aspects of rural development. Government respondents have continually expressed that their consumers can not afford the high prices that most rural providers charge for advanced services. However, rural providers do understand the need for competitive pricing, although they claim that they have the right to charge hire prices to recoup costs

due to higher than normal operational expenses. This emphasizes the need for cooperation between rural providers and local initiatives to aggregate demand and to find ways to lower provider costs. It is obvious after these respondent interviews that advanced telecommunication services will never be offered at competitive prices to rural areas or even built in some cases, unless the demand and subsidies that rural providers need to operate efficiently are available.

- **The Digital Divide**

Both groups said the digital divide was apparent in their communities, but many said it seemed to be slowly closing as more people become technologically proficient. Despite these improvements, many respondents still felt that when compared to urban communities, rural areas are far behind the general knowledge base of society. The government respondents emphasized the effect it has on education, businesses, and the overall knowledge level of its consumers. The providers mainly focused on the effect it has on the income demographic, in that wealthier consumers are able to pay higher than average prices which leave low-income consumers without the benefits of advanced services. This same theory applies to rural schools and other public entities that are commonly under funded and can not afford the same services that urban schools typically have. The Digital Divide may appear to be closing slowly to some respondents, but when considering the rate of advancements that typically occur in urban areas; the divide may actually increase over time as rural communities are continually expected to rely on legacy services.

- **The Future**

Of the local governments that were interviewed, most surprising was that none had any relevant future plans to spur rural telecommunication and what had been explored had not produced any significant results beyond planning initiatives and status reports. The providers that were interviewed spoke of plans to built new facilities and introduce new technologies, but despite these efforts to increase development, many have struggled to make their plans work. This study can not represent the actions of all local governments, although from these interviews, it is apparent that rural local governments (in Michigan) are not providing enough support or interest to make the expansion of advanced services lucrative or desirable for the rural providers. The advancement of Michigan's rural telecommunication and information services depends on the local government's ability to embolden providers to make service offerings that will enhance existing rural lifestyles by assuring new and expanded communication infrastructure is in development. It is feasible that some rural providers may not desire to change their business plans or upgrade services, but if this is the case, local governments must again work to find a way to alter the difficult landscape of rural telecommunications.

4. Strategies, Policies and Solutions to Enhance Advanced Services in Rural Communities

The following recommendations are based on research data collected for the NEMCOG/M-SITE Broadband Services Report (BSR), personal interviews conducted to supplement the report, and attained knowledge from past experiences in rural communities. Additionally, miscellaneous publications and studies about rural telecommunication development were also used for validity. These recommendations are intended to assist rural governments and other public service entities with the development of strategies, policies, and solutions that will hopefully improve the availability of advanced telecommunication services in rural areas throughout the nation and the world.

4.1 Alternative Provision

It is unlikely that competitive telecommunication providers will seek to improve advanced services in rural areas on their own. National incumbent carriers continually over-look the needs of rural communities and small carriers can not typically afford the upgrades and access fees to provide broadband services. The same difficulties apply to cable providers that typically only offer basic services and can not afford to upgrade their services with digital technology. To address the slow evolution of incumbent services, one option may be for rural communities to seek out alternate forms of provision.

- **Municipal Provision**

Municipal provision has recently become a popular idea, as well as a controversial one. Many communities across the nation such as Coldwater, MI and Scottsburg, Indiana have constructed municipally owned networks to serve customers and many remain successful, although with pressure from large telecommunication providers, many states have formed legislation preventing these networks. Municipally owned networks tend to charge lower than average prices and operate with the best interest of the community. Such attributes would work well in rural areas that are economically distressed and need support, although the problem of funding still exists, since many rural municipalities can not afford investment costs without outside funding support. Additionally, local governments have a difficult time justifying the public investment, "because elected officials are wary of investing in broadband infrastructure without knowing the public will immediately value, accept, and use that infrastructure."[34]

With many states outlawing this type of network, it may not prove to be an overall solution for rural deficiencies, but may apply in certain circumstances.

- **Cooperative Provision**

Like municipal provision, cooperative provision is commonly fought by incumbent providers who fear revenue loss due to unfair competition. Telecommunication co-ops work well in rural areas for multiple reasons; such endeavors are qualified for federal loans and can subsidize costs from the Universal Service Fund or high-cost fund. Co-ops generally use revenues to continually expand their infrastructure and services instead of

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[34] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 4.

trying to maximize profits like competitive carriers. The co-op model generally results in advanced networks with a high level of customer satisfaction.

An example of this model is a non-profit telephone cooperative in Michigan called Allband Communications Cooperative. Telephone cooperatives have long been illegal in Michigan, but when the legislation was lifted, Allband applied to become an incumbent local exchange carrier and now serves its own previously unassigned exchange in northeast Michigan. With a loan from the Rural Utility Service, Allband is in the process of constructing an all passive fiber to the home network and plans to offer telephone, broadband and video services for a minimal price to its co-op members.

Although co-ops may not be practical in some areas, they are a unique solution for rural areas that are severely deficient in telecommunication services or have none at all.

4.2 Backbone Aggregation

Necessary backbone infrastructure (usually in the form of OC-3 or as high as OC-192) is a key component to the evolution of rural telecommunications due to its function as an efficient high bandwidth access point and transport medium for providers. Incumbent providers typically address concerns that areas lack enough backbone by adding more backbone infrastructure as demand increases. While understandable, this does not assist rural areas that are underserved by their incumbents and it also causes an entrance barrier for new CLECs and ISPs. Additionally, utility companies, railroads and other entities install fiber backbone which typically remains unknown and unused by the public. Rural communities should track what fiber backbone surrounds their area and which lines are

accessible to providers; many companies reserve dark fiber for such circumstances and typically can offer bandwidth for a fee.

To address areas that have no backbone within a feasible proximity, demand aggregation should be initiated to attract investments by gathering groups that will agree to purchase bandwidth from the backbone providers.

4.3 Last Mile and Termination Issues

A lack of last mile or user termination infrastructure severely limits the ability to gain broadband access in rural areas. Most rural consumers are too far from central office locations to obtain broadband access such as DSL and if a premise has coaxial cable, it is unlikely that rural cable companies offer any cable broadband services.

To address the last mile issue, many rural ISP providers have constructed wireless networks to reach these customers. Unfortunately, most of these applications are not reliable, suffer from interference, and are sometimes as slow as a dial-up modem. To remedy this situation, wireless providers are starting to acquire unused educational spectrum in rural areas that provide fixed carrier grade wireless signals. Rural companies that obtain these licenses can build a wireless backbone around rural communities and couple them with dependable unlicensed applications which serve the end-user. Rural planners should focus efforts to address the last mile problem and continually seek out new ways to reach consumers with broadband services. By finding alternate methods to enter homes and businesses with broadband, incumbent providers who have wired access to the customers will eventually be inspired to offer their own broadband services.

4.4 Local Government Policy

Rural telecommunication markets commonly suffer from 'market failure' or the inability of a market to offer needed services without intervention. A study done by the Minnesota Center for Rural Policy and Development concluded that, "most of the studies looked at for this paper emphasized that developing markets to the point where they can work on their own is the desirable way to ensure adequate access for a community. Counting on competitive markets to provide this access, however, brings with it a set of hazards in the form of market failure."[35]

The study suggested that there are multiple types of rural market failure: single-provider markets, difficult-to-enter markets, and prohibitively high costs to consumers markets. This theory of market failure reinforces why local governments stand to be the single most important aspect of rural telecommunication development.

In the case of Northeast Michigan, both federal and state policies have achieved limited results for the most deficient areas and many rural communities have little expectations for the future.[36] Without decisive action from local governments, rural Michigan communities will remain deficient in advanced services and the digital divide between urban and rural communities will continually increase. The sections below introduce new methods of planning that local governments can implement to enhance telecommunication development.

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[35] Center for Rural Policy and Development. "Minnesota Rural Telecommunication Initiative". <http://www.mnsu.edu/ruralmn/pages/Publications/reports/telecomdraft.pdf>

[36] Refer to Ch. 3. Pgs. 54, 72, 84.

- **Zoning and Right of Way (ROW)**

Zoning ordinances and right of way permitting continue to remain a legitimate problem for advanced service implementation. The federal and state governments often enforce requirements which may not concur with local ordinances and despite such legislation, zoning, and ROW issues commonly fall within local jurisdiction and in turn create many challenges for providers when planning new infrastructure in rural areas. Additionally, these policies often differ among the local governments and in turn create additional barriers. The following list of policy changes could be incorporated to remove current barriers to telecommunication expansion.

- Modify land-use permits for areas that currently prohibit the installation of telecommunication infrastructure.
- Modify tower ordinances and add aesthetic demands to preserve the rural environment.
- Incorporate dark fiber or other infrastructure into future ROW constructions such as sewer, power, sidewalk and road construction.
- Create a policy that makes capable local carriers the primary service provider for the local government.
- Encourage the use of underground infrastructure in new residential development that is easily accessible to providers.
- Require that future industrial and commercial parks install telecommunication infrastructure for curb-side cross-connection.
- Make publicly owned land accessible to competitive providers with restrictions.

It is also recommended that community officers, road commissions and state officers establish ubiquitous policies so that providers may establish services in multiple communities without significant challenges. This unity will help aggregate demand in

the communities and provide a more cost effective planning for providers who desire to serve rural areas that are adjacent to each other.

- **Taxes and Fees**

The taxes and fees that state and local governments charge providers have long created development barriers in rural communities. The Michigan Economic Development Corporation (MEDC) stated that, "sections 251 and 254 of the Michigan Telecommunications Act have resulted in legal battles over the fees communities can assess providers."[37]

The MEDC also explained that, "While courts continue to limit the types of fees that can be assessed, the dialogue on this subject has kept the focus away from the most important issue-the needs of users."[38]

The fees and taxes that providers face in rural areas decrease the feasibility of provider investment due to the high-costs that are already associated with rural development. As an example, Table 4.1 outlines what taxes are paid by providers in the state of Michigan.

Licensed Carriers	• State Central Property Tax
Cable Carriers	• Local Property Tax • Franchise Fees
Unregulated Wholesale Carriers	• Local Property Tax
Incumbent Providers	• ROW Fees
New Competitors	• ALL FEES

Table 4.1 Carrier Taxes in Michigan

[37] Michigan Economic Development Corporation. 2003. <http://medc.michigan.org/cm/attach/94595AF5-BAE2-4BEE-856A-22DA8A130538/linkmichigan2.pdf>

[38] Michigan Economic Development Corporation. 2003. <http://medc.michigan.org/cm/attach/94595AF5-BAE2-4BEE-856A-22DA8A130538/linkmichigan2.pdf>

As shown, new competitors are required to pay many of the taxes and fees that other established companies do not. If a comprehensive tax package could be developed that creates common taxes and fees, new competitors could financially afford to expand into rural areas. It is recommended that local governments work with the state government and each other to develop discounted taxes, tax credits, and fee structures that provide relief for rural providers that seek to invest in new infrastructure and services. Examples of such relief are specifically zoned areas that provide tax relief if development occurs. Such policies provide incentive for businesses and providers to invest in rural areas.

- **Information Access and Quality of Service**

During outside discussions[39] with competitive providers, it was found that most rural companies had difficulty interconnecting and negotiating with incumbent rural providers. This was typically due to a lack of cooperation, information sharing, and interconnection compatibilities. It was additionally found that residents and businesses that re-locate or develop in rural areas are sometimes under false assumptions that advanced services are available when they are not. To remedy these problems, it is recommended that state and local governments enact laws or policies that require regulated and unregulated telecommunication providers to provide network information based on geographic location. This will address competitive carrier concerns regarding unknown interconnection capabilities and will also improve the general knowledge of rural governments and consumers so that they may better plan for their future needs.

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[39] The author has a general understanding of this issue from personal conversations and meetings in rural communities.

Additionally, providers should be required to abide to quality of service standards which will ensure that there is a ubiquity of services throughout the rural territories. This will insure that any advanced services offered are of the same quality and have the same availability in all regions of a served territory. These standards can be linked to the right of way permit process and can be a stipulation that must be followed in order to access state or county owned right of way.

- **State and Federal Assistance**

Rural areas have distinctly different situations that prevent growth of advanced telecommunication services. To give rural communities an opportunity to solve their own deficiencies, local governments should continually pressure the federal and state governments to provide continuous grants and matching based funds for the development and implementation of strategies to improve rural telecommunications. A continual availability of funds (which should be limited based on progress) will give rural communities the resources to successfully plan strategies and oversee their implementations, since past endeavors like the LinkMichigan Initiative have resulted in various strategies, but no concrete results. It should also be noted that due to the involvement of state funding, it may be necessary to limit the funding to initiatives that will attract private investment, rather than public provision solutions.

Additionally, there are many federal and state funding opportunities that can be utilized in rural areas that can assist in advanced service acquisition and cost reduction. It is recommended that rural governments form strategies to continually monitor the status of federal and state backed grants and cost reductions.

- **Demand Aggregation**

A lack of demand is a primary reason why providers will not build or enhance services in rural areas.[40] Due to the barriers that are faced by rural providers, demand aggregation may be the only feasible method to attract them. Local governments should work with educational institutions, public safety, health facilities, museums, libraries, and other local entities to aggregate purchasing power. By pooling purchasing power, these groups can issue requests for proposals (RFP) from private-sector companies who may be interested in serving rural areas. By utilizing an RFP system, the communities will be able to choose the most cost attractive solution and additionally, will bring backbone infrastructure to the community. To address investment costs, the needed backbone to reach rural communities could be a cooperative investment by multiple companies such as a backbone provider and another provider who could supply hard line and wireless connections to surrounding subscribers. The NLEA reinforced this idea and said that, "some action may have to be taken to assist a single or limited set of providers in actively pursuing aggregation of potential customers, participating in securing those customers for the provider, or providing additional incentives or safety nets for providers."[41]

By aggregating demand through the RFP process and providing other incentives, providers may be willing to invest if an attractive amount of financial return is contracted. Additionally, by committing the public sector needs to one or multiple providers and attracting needed infrastructure, residents and businesses can in turn utilize the infrastructure that is available for basic and advanced telecommunication needs. The

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[40] Please see table 2.1.
[41] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 29.

excess capacity of the backbone providers can be made available to other small rural providers on a non-discriminatory wholesale basis which will improve the ability for small rural providers and ISPs to offer needed broadband services.

Finally, research revealed that computer use was high in certain rural areas despite a lack of advanced services.[42] Clusters of high computer use should be noted and forwarded to telecommunication providers as incentive to build out infrastructure to them.

- **Public Service Buying Pools**

As previously mentioned, public service entities are an important aspect of rural telecommunication development. Public services such as local governments, schools, libraries, museums, health care facilities, fire departments, and police stations all have the unique power of cooperation. It is recommended that all public entities form buying pools that combine financial resources and purchasing power. By aggregating purchasing power, this gives public facilities the leverage to lower costs and provide financial stability for telecommunication providers who may desire to invest in advanced services. The NEMCOG and MSU stated a similar point in that rural communities need, "to integrate or aggregate services between businesses, schools, governmental entities, and other organizations uses to spawn sufficient mass utility to cultivate stronger business development by attractive robust telecommunication infrastructure."[43]
Local governments should also consider funding government controlled high-speed networks that connect each institution via fiber optics or fixed wireless technologies. By

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[42] Please see table 2.4.
[43] Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004. 2.

interconnecting each institution, a buying pool can then negotiate to interconnect at a single point of presence and purchase advanced services from competitive carriers on a contractual basis.

- **Local Planning Representation**

Research has shown that most rural communities lack government planning that is specifically committed to the development of telecommunications. While it is understood that local funding is limited and these responsibilities are usually given to economic developers, it is clear that groups committed to telecommunication development may be necessary. The NLEA similarly stated in their LinkMichigan Report that, "a prime recommendation provided by the study consultant is the development of a type of "broadband council" that would act as an advocate of broadband matters throughout the NLEA region."[44]

Research implied that most local governments do not have the necessary knowledge or sense of urgency to successfully improve telecommunication services.[45] It is recommended that local rural governments hire or train a suitable amount of staff that can address telecommunications deficiencies and be held responsible for the planning and development of solutions. These officials should maintain constant communications with the federal and state governments, as well as other rural officials that hold the same responsibilities. This will maintain a ubiquitous information network that can formulate new strategies and policies, obtain state and federal funding and at the same time aggregate service from providers through demand aggregation and research. The

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[44] Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004. 27.
[45] Please see pg. 72, paragraph 2.

following deliverables could serve as guidelines for those who may acquire such responsibilities:

- Maintain a database of current providers and where their services are offered and what is panned for future development.
- Coordinate with local providers about quality of services and work to implement new services.
- Continually seek demand aggregation and coordinate buying pools to obtain advanced services.
- Determine what areas are successfully served by alternative providers such as wireless ISPs.
- Explore new technologies that could be used to reach un-served consumers and how to interconnect them with current points of presence.
- Determine costs associated with these ideas and how best to implement them.
- Continually seek funding from the federal and state governments for new strategies.
- Contract subscriber equipment that can better serve consumers when cross-connected with providers.

- **Technology Centers**

Due to an inability to obtain a return on investment, most providers refrain form building out to dispersed customers that have no service. To address this, it is recommended that rural communities develop technology centers that broadband hungry businesses, government offices and other entities can utilize. For example, an office complex or industrial park that is used by multiple entities can aggregate buying power to attract a telecommunication carrier that will provide advanced services. This concept reduces the cost of delivery and distribution which in turn reduces costs for the subscribers. By

developing technological centers, providers will have an incentive to move into rural communities and eventually spin-off its services to the rest of the community. If such complexes are not government owned, it is likely that the developer of the technology centers will have to incur a significant amount of up-front costs, but as mentioned before, rural communities can offer tax-free incentive zones for such complexes which will provide financial relief for the developers.

To supplement technological complexes, local governments should install various "hot spots" or community centers to access networks with wireless or hard-lined services. Libraries typically house such services, but an alternative example would be small indoor buildings which would allow consumers to congregate and utilize services in a centralized location. These locations could be coupled with commercial businesses such as coffee houses or restaurants which would in turn assist in economic development. Additionally, local governments could sponsor technology fairs, focus groups, career fairs and other activities to promote education and technological development. By increasing the amount of locations and saturating the communities with access, user demand and interest will increase.

4.5 Educational Responsibilities

Educational institutions and public service entities such as police departments, fire departments, libraries and museums not only play an important role in the education and quality of life for rural communities, but also provide a unique tool to aggregate advanced telecommunication services.

It has been implied that there is a lack of technological education in rural both rural children and adults. By increasing the overall community education of advanced

services and the technologies that supplement them, demand for such services will gradually increase. Therefore, rural schools must work to improve their curriculum and exposure to technology. Technology proficient children will eventually become proficient adults, which will result in a proficient community. Research interviews[46] commonly revealed rural schools that did have computer capabilities, but were limited by insufficient telecommunication services. In some cases, it was revealed that some school administrators had been using low bandwidth services when other high-bandwidth services were available from other providers. It is therefore essential that the officials who run rural schools be proficient in telecommunication services and their availability. It is understood that some services that are available may be too expensive for educational budgets, so it also recommended that rural schools form partnerships with local governments and other public entities to aggregate demand for improved services that are cost efficient. Additionally, there are also federal and state programs, along with grant monies that can provide additional funding for educational facilities that are in high-cost areas. These options appear to be generally ignored or over-looked by many institutions.[47]

Schools and local government planners should also offer community training in the form of classes, forums, and focus groups which educate the public on the uses and benefits of advanced services and how to use technologies such as personal computers. These informative sessions will keep the rural public informed on new services and how to best utilize their current services. This training should also be offered to rural

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[46] Note: this information was obtained prior to studies conducted for this paper.
[47] Note: this information was obtained prior to studies conducted for this paper.

businesses that seek to improve their operations with the use of technologies, e-commerce, and networking.

4.7 New Technologies

The following technologies are recommended solutions for rural areas and may serve as alternatives to traditional methods of transport such as twisted copper and coaxial cable. Although challenging and expensive, these solutions would be useful for backbone as well as last mile solutions.

- **Wireless**

Wireless applications remain the most promising solution for last mile deficiencies in rural areas. The hilly terrain and dispersed populations make it difficult to build wired infrastructure to all rural customers and such subscribers are typically unable to obtain broadband services. It is recommended that rural communities continually monitor the progress of wireless technology and to cooperate with current or new providers who desire to serve rural areas with these technologies.

MMDS

New applications using Multi-channel Multipoint Distribution Service (MMDS) could reach dispersed rural customers up to 70 miles away, although the signal loses distance with hilly terrain. This could prove to be a useful tool for many providers and especially cable providers who have recently been de-regulated and can offer telephone and data services. Since cable companies have access to broadcasting towers, they could easily affix a MMDS antenna for broadcasting. There are still concerns with equipment costs,

although most cable providers normally charge leasing fees for cable boxes and other equipment.

WIMAX (802.16a)

Another potential application is the introduction of 802.16a or WIMAX. This wireless technology is highly reliable, can transfer data up to 75 mbps and can span 30 miles. While this technology is not widely used, it is promising for broadband providers who can not reach customers with a reliable signal.

Wireless Regional Area Networks (WRAN 802.22)

Additionally, a new protocol called 802.22 is being proposed that will utilize the "white space" between broadcast TV channels for wireless broadband. By using these unused frequencies, it would be possible to broadband beam signals as far as 40 kilometers in rural areas. The FCC has proposed the usage of these channels and the technology would stand as another useful solution or last mile deficiencies in rural areas.

- **Fiber to the Premise (FTTP)**

Although expensive, fiber to the premise has the ability to transport all telecommunication applications at once. Constructing fiber in rural communities seems unfeasible due to costs and planning, although it is the most comprehensive way to ensure that rural communities have access to advanced services.

Rural communities should therefore work with providers to converge services over cooperative fiber optic lines. If telephone, video, and data providers, converged their networks in rural communities, it would result in tremendous savings for the companies. Although it is unlikely that providers would cooperate in such a matter, it would result in less infrastructure deployment and faster investment returns. However, to

prevent provider disagreement, local governments could construct their own fiber network in their communities and sell bandwidth to the providers who can then offer services to customers. Once demand is aggregated; the municipality can decide to hold on to its investment or attempt to sell it to interested private providers.

- **Instructional Fixed Telecommunication Services (ITFS)**

ITFS was created in 1963 for educational facilities to use for broadcasting in schools. In 1983, the FCC released a large number of the ITFS channels for wireless competition and in 1998 changed its policies to allow digital and two-way communication via the ITFS towers. These towers are located strategically throughout rural areas and could prove to be useful solution for rural broadband deficiencies. Each tower has a range of 20-35 miles and would work well for small rural communities and outlying residents. ITFS has twenty 6MHz channels and is licensed by the FCC, although excess capacity may be leased to providers that offer subscription services. It is recommended that rural governments become familiar with the ITFS technology and to contact vendors who may desire to affix wireless applications to them for broadband provision.

- **Power Line Carriers (PLC)**

Power Line Carriers or Carrier Current Systems (CCS) has been the most controversial rural broadband application over the last few years. Its ability to transmit information over existing utility infrastructure has appeared to be the most promising last mile solution for rural areas since most consumers has a power line connected to their premise. Despite positive FCC endorsements and its possible rural application, BPL is still unproven and not widely used. The technology remains relatively expensive due to the

amount of electrical equipment that is needed and there are concerns over radio interference. The NEMCOG/MSU stated in their Broadband Services Report that, "PLC transport is still unproven and has yet to be utilized in a large market. There is also concern that such technology will interfere with other radio traffic on un-shielded power lines. PLC has much promise in the telecommunication industry and once perfected, could serve as a universal solution for last mile deficiencies."[48]

It is recommended that rural communities explore new developments in PLC technology and to work with PLC developers to beta test and possibly serve rural communities with the technology.

[48] Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004. 129.

5. Conclusion

It has been suggested that most rural consumers are not generally pleased with their current telecommunication services and that the need for advanced services is growing. Additionally, it appears that communities will rely heavily on the future implementation of advanced services to improve economic development and their quality of life. There are many barriers that must be crossed to implement these services and there is unfortunately no ultimate solution. To ensure that improved services are rapidly advanced, rural governments must assume a predominant roll and help facilitate needed policies, activities, and solutions to improve rural telecommunications. The aggregation of demand, improved education, and cooperative partnerships are all examples of ways that rural governments can ensure that improved telecommunication services are developed and in turn, provide a successful future for their communities.

APPENDIX

Broadband Services Report (BSR) Residential Survey

M-SITE Residential Survey Form
Presented by:

Please circle the number next to the answer that most accurately describes your situation.

1) Which of the following products or services do you use or subscribe to at home? (Circle all that apply)

   1) Local telephone service
   2) Long distance telephone service
   3) Cellular mobile phone
   4) Broadcast television
   5) Cable television
   6) Satellite TV (Direct TV or Dish Network)
   7) Personal computer
   8) Internet service

2) Which of the below Internet access options are available to your home?

   1) Regular Phone line
   2) High speed (please specify type and speed) _____
   3) Satellite
   4) Other _____
   5) I am unaware of Internet options

3) If high speed Internet access is not available in your area, do you think that it should be developed?

1) Yes
2) No
3) Don't know

4) What is your gender?

1) Male
2) Female

5) When is your date of birth? _____ (Month/Day/Year)

6) What is you street address? _____

_____

On a scale of one to seven, one being not adequate and 7 being exceptional, how would you rate the adequacy of the services that you currently subscribe to at home? *A score of 4 is adequate*

1. Local telephone service:
   1---------2----------3----------4----------5----------6----------7
   Not adequate Exceptional

2. Long distance telephone service:
   1---------2----------3----------4----------5----------6----------7
   Not adequate Exceptional

3. Cellular phone service:
   1---------2----------3----------4----------5----------6----------7
   Not adequate Exceptional

4. Broadcast television service:
   1---------2----------3----------4----------5----------6----------7
   Not adequate Exceptional

5. Cable television service:
   1---------2----------3----------4----------5----------6----------7
   Not adequate Exceptional

6. Satellite television service:

1---------2----------3----------4----------5----------6----------7
Not adequate Exceptional

7. Internet service:
1---------2----------3----------4----------5----------6----------7
Not adequate Exceptional

Thank you for your time!

Please use the pre-paid envelope to mail this booklet back to Michigan State University

Broadband Services Report (BSR) Business/Public Sector Survey

M-SITE Business Survey Form
Presented by:

Please select the answer, which is most suitable to you and your situation.

1. What is your primary company function?
(Check all that apply)

__ 1. Accounting
__ 2. Agriculture
__ 3. Architecture/Engineering
__ 4. Association/Trade Group
__ 5. Computer/Software Related
__ 6. Consulting
__ 7. Financial/Insurance
__ 8. Government
__ 9. Legal Services
__ 10. Manufacturing/Industrial
__ 11. Medical
__ 12. Retail Sales
__ 13. Telecommunication
__ 14. Warehousing/Distribution
__ 15. Others please specify: _____)

2. Currently, do you use computers in your day to day business affairs?

__ 1. Yes
__ 2. No

3. If yes, are your computers networked?

__ 1. Yes
__ 2. No

4. Does your company have Internet access on its premises?

__ 1. Yes
__ 2. No

5. Which type(s) of connection(s) do you use for connecting to the Internet?
(Check All that Apply)

	Currently Use	Wish to Have and Available	Wish to Have but Not yet Available	Not Interested
Dial up telephone				
Satellite PC				
Cable Modem				
DSL				
ISDN				
DS1/T1				
DS3/T3				
Frame Relay				
Others:				
Please Specify				

6. Which of the following telecommunication services do you use?
(Check All that Apply)

	Currently Use	Wish to Have and Available	Wish to Have but Not yet Available	Not Interested
Automated Call Routing				
Cable TV				
Cell Phones				
Company Website				
Competitive Local Phone Service				
E-mail				
Local Area Network				
Network Faxing				
PBX				
Secure Web-server				
Videoconferencing				
Virtual Private Network				
Voice Mail				
Wide Area Network				
Wireless Network				
Others:				
Please Specify				

7. How would you rate the quality of your current telecommunication providers?

	Good	Fair	Poor	Not Available
Telephone				
Wireless				
Internet				

Other Services:
Please Specify

8. What role will the availability of telecom services play in your decision to renew your existing lease or remain in your area?
(Check one)

__ 1. None at all
__ 2. Somewhat
__ 3. Very Important

9. Would you be interested in training programs implemented by Michigan State University to meet your technological needs?

__ 1. Yes
__ 2. No
__ 3. Not Sure

10. Do you have any concerns and comments regarding telecommunication services in your area?

Personal Interview Questions

1. What is your name and occupation?

2. What are your occupational responsibilities?

3. How long have you held your current position?

4. In your opinion, what constitutes rural when describing "Rural America"?

5. Do you believe there is a need for advanced telecommunications development in rural America?

6. In your opinion, how will the implementation of advanced telecommunications affect rural communities?

7. If advanced services are implemented, do you think service use and technology acquisition by consumers will increase?

8. Do you think the implementation of advanced services will enhance rural health care?

9. Do you think the implementation of advanced services will enhance public safety?

10. Do you think the implementation of advanced services will enhance rural education?

11. Do you think the implementation of advanced services will enhance the quality of life in rural areas?

12. Do you think the implementation of advanced services will assist with economic development in rural areas?

13. Do you think improved consumer education about advanced services will create more demand for such technologies and services in rural areas?

14. Do you believe the federal government has developed policies that sufficiently promote advanced telecommunication development in rural areas?

15. Do you believe the state government has developed policies that sufficiently promote advanced telecommunication development in rural areas?

16. Do you believe the local government has developed policies that sufficiently promote advanced telecommunication development in rural areas?

17. Should rural development be the responsibility of the government?

18. Should rural development depend on private sector/competitive development?

19. Are traditional market forces enough to successfully attract private telecommunication providers to rural areas?

20. Do you feel that rural telecommunication providers obtain a sufficient volume of business to successfully operate?

21. Do you believe current rural telecommunication providers successfully serve the needs of consumers in rural areas?

22. Please briefly describe any past attempts to improve rural telecommunications by your organization or yourself.

23. Do you or your organization have any future plans to improve telecommunications in rural locations?

24. In the last five years, have you noticed a developing interest in advanced services in your area, or has consumer interest remained relatively the same?

25. How important is the cost of advanced services in your opinion?

26. If implemented, do you think providers have the right to charge higher than normal prices in rural locations?

27. Past research has shown that demographic differences such as age, education, income, geographic location and race influence what technologies and telecommunication services consumers typically utilize; this is commonly know as the digital divide. Do you see such a division in your area?

28. If you believe a digital divide exists, how is it affecting rural society?

29. Do you think the digital divide is improving, worsening or the same?

30. Off the top of you head, do you have any more ideas or suggestions on improving advanced services in rural communities?

REFERENCES

REFERENCES

Bureau of Economic Analysis. Regional Economic Accounts.
<http://www.bea.doc.gov/bea/regional/spi/drill.cfm>

Center for Rural Policy and Development. "Minnesota Rural Telecommunication Initiative". October 1999.
<http://www.mnsu.edu/ruralmn/pages/Publications/reports/telecomdraft.pdf>

Federal Communications Commission. "Federal Communications Commission Releases Data on High-Speed Services for Internet Access". 8 June 2004.
http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/hspd0604.pdf

Greenspan, Robyn. "The Digital Dirt Road Divide". 23 February 2004.
< http://www.clickz.com/stats/sectors/demographics/print.php/3316541>

Michigan Economic Development Corporation. 2003.
<http://medc.michigan.org/cm/attach/94595AF5-BAE2-4BEE-856A-22DA8A130538/linkmichigan2.pdf>

Nextel Communications.
<http://nextelonline.nextel.com/NASApp/onlinestore/Action/RatePlanLanding?nextPage=RatePlanLanding&initstate=true&redirect=false&id4=shop_link2;rate_plans>

Northern Lakes Economic Alliance. "Link NLEA Broadband Study". 2004.

Northeast Michigan Council of Governments, Michigan State University Site for Information and Telecommunication Experimentation. "Broadband Services Report". 2004.

United States. United States Telecommunication Act .47 USC 157
Saskatoon Health Region. December. 2004
<http://www.sdh.sk.ca/ships/PHReports/senreport/Main/Glossary.htm>

United States Census Bureau, "Urban and Rural Classifications".
<http://www.census.gov/geo/www/GARM/Ch12GARM.pdf> (12 June 2004)

United States Census Bureau . Michigan Quick Facts. 1 Feb 2005.
<http://quickfacts.census.gov/qfd/states/26/26135.html>

United State Telecom Association. "Telecom Statistics".
<http://www.usta.org/index.php?urh=home.news.telecom_stats>

Universal Service Administrative Company. Funding Commitments FY2004. <http://www.sl.universalservice.org/funding/y2004/waves/state_totals.asp>

Verizon Wireless. <http://www.verizonwireless.com/b2c/CoverageLocatorController?requesttype=ZOOM%20LEVEL%20REGION>