

# Metronet Report

School of Urban and Regional Planning



Class Led by Dr. Chuck Connerly, Dr. Lucie Laurian, and Dr. Jerry Anthony

Qilu Chen  
Jeff Gepper  
Dea Qatipi  
Juliana Lucchesi

**Decorah Metronet**



This project was supported by the Iowa Initiative for Sustainable Communities (IISC), a program of the Provost's Office of Outreach and Engagement at the University of Iowa that partners with rural and urban communities across the state to develop projects that university students and faculty complete through research and coursework. Through supporting these projects, the IISC pursues a dual mission of enhancing quality of life in Iowa while transforming teaching and learning at the University of Iowa.

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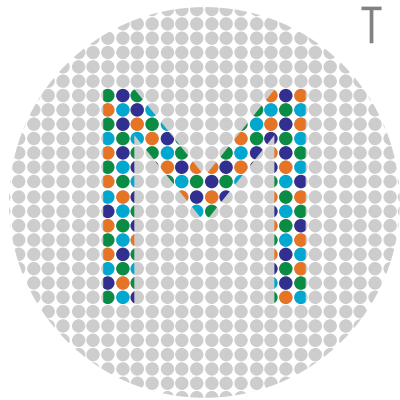
111 Jessup Hall

Iowa City, IA, 52241

Email: [iisc@uiowa.edu](mailto:iisc@uiowa.edu)

Website: <http://iisc.uiowa.edu/>

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THE DECORAH

ETRONET

FIBER BROADBAND NETWORK

Qilu Chen | Jeffrey Gepper | Juliana Lucchesi | Dea Qatipi



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## Acknowledgment

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We would like to thank our project partners in Winneshiek County, faculty advisors, and classmates that have devoted hours of their time to guiding, supporting, and helping us successfully complete our 2016 Field Problems project. This project has gathered national attention, achieving a 2<sup>nd</sup> place award at the 2016 American Planning Association National Conference in Phoenix, AZ. This could not have been possible without the support of all individuals and groups mentioned below.

We would like give special thanks to our project partners from the Decorah MetroNet.

The City of Decorah | Winneshiek Medical Center | Decorah Community School District  
Luther College | Winneshiek County | Upper Explorerland Regional Planning Commission

We would also like to thank our faculty advisors and the Iowa Initiative for Sustainable Communities for their guidance and assistance throughout the project.

Faculty Advisors: Dr. Jerry Anthony | Dr. Lucie Laurian  
IISC: Dr. Charles Connerly | Nick Benson | Sarah SanGiovanni





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## Executive Summary

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Rural Winneshiek County, in northeast Iowa, is home to the Decorah MetroNet (DMN), a fiber-optic telecommunications network. The DMN is owned and operated by a collaborative, public-private partnership between six anchor members. The network serves seventeen locations owned by DMN members in the City of Decorah. The DMN was established to satisfy demand for affordable, high-speed internet. The partnership now aspires to expand beyond current infrastructure and membership to optimize broadband expansion and adoption. However, the DMN has limited fiscal and organizational resources to expand their fiber optic network efficiently and equitably to potential users.

The objective of this project was to assess and recommend expansion plans that achieve the goals of DMN and yield the greatest amount of benefits for the community. Surveys, interviews, and a community visioning session were conducted to assess the current internet service conditions and identify future digital priorities in Winneshiek County. Opportunities for organizational changes to the DMN and an open access network were assessed for strengths and weaknesses to identify possible legal issues, ability to expand the membership, and grow the physical network. Investment scenarios were developed to determine the spatial reach and financial feasibility of various expansion build-outs.

The final recommendations are divided into two sections: organizational structure and investment scenarios. The organizational recommendations include opportunities, threats, and future considerations for the DMN moving forward as a tiered 28E organization, operating under an open access framework. The investment scenario recommendations involved assessing each scenario for the number of DMN and community goals achieved, as well as cost effectiveness. A final implementation plan was prepared to guide both the DMN and the community to further expand broadband access in the region.



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# Chapter One

## INTRODUCTION

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1.1 Broadband in America

1.2 Fiber-optic Characteristics & Advantages

1.3 Profile of Winneshiek County & Decorah

1.4 Scope of Work & Project Goals



## 1.1 Broadband in America

Infrastructure networks in the United States are essential for uniting residents and businesses with each other and the global community. Beginning with the expansion of the railroad system in the 1860s, the United States has invested publicly and privately to improve the national infrastructure system (McMahon, 2012). Evolving from the telephone system to today's broadband technology, communications infrastructure has opened up opportunities for the sharing of ideas around the globe, job growth, and invention of new products and services. Broadband, like all forms of infrastructure, requires large upfront infrastructure investment and research to support new technologies.

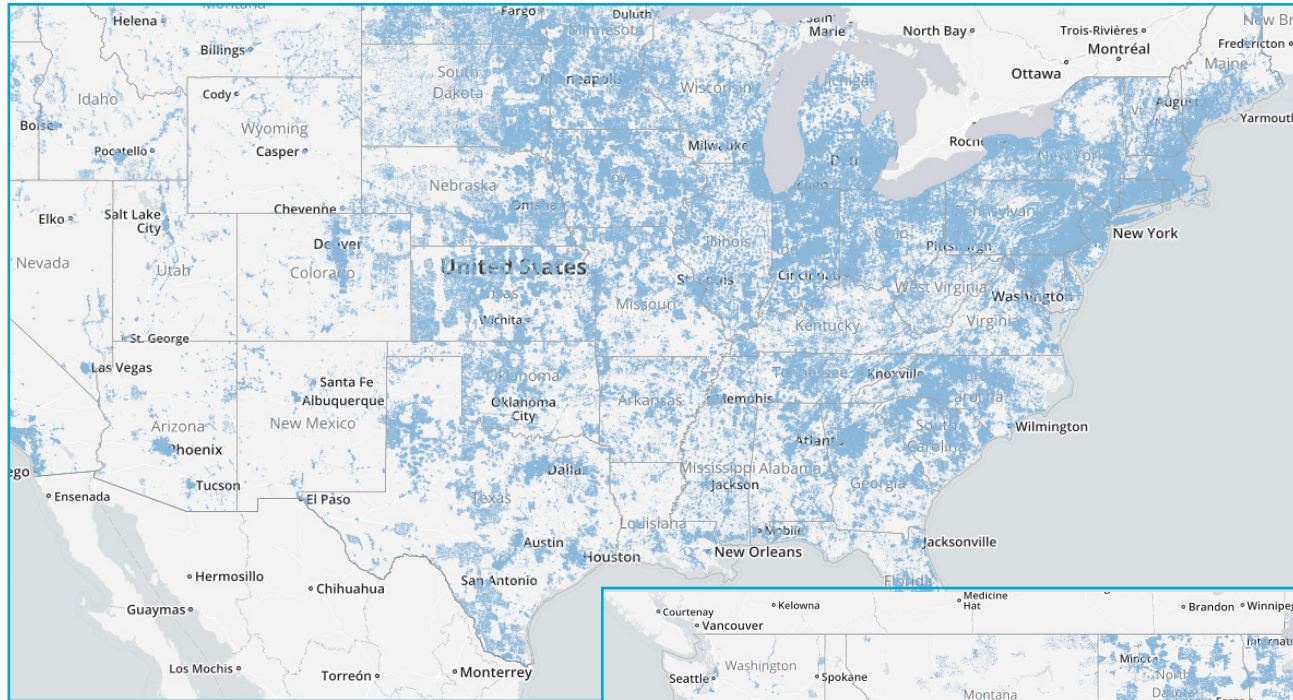
Broadband expansion and adoption echoes the challenges met by the Rural Electrification Administration (REA) in the early 20th century (Ohio History Central, 2013). Similar to installing electric lines across the United States, broadband will require the same level of government investment and intervention. In 2010, the Federal Communications Commission (FCC) released the National Broadband Plan (Federal Communications Commission, 2010). The plan outlines national goals and provides opportunities to expand broadband infrastructure. It creates adoption programs designed to increase economic competitiveness and residential access to online resources. The FCC created Connecting America, an initiative centered on collecting data



Figure 1.1: REA erecting power lines (Top).

Figure 1.2: Installing underground fiber-optic cable using the knifing technique (Bottom).

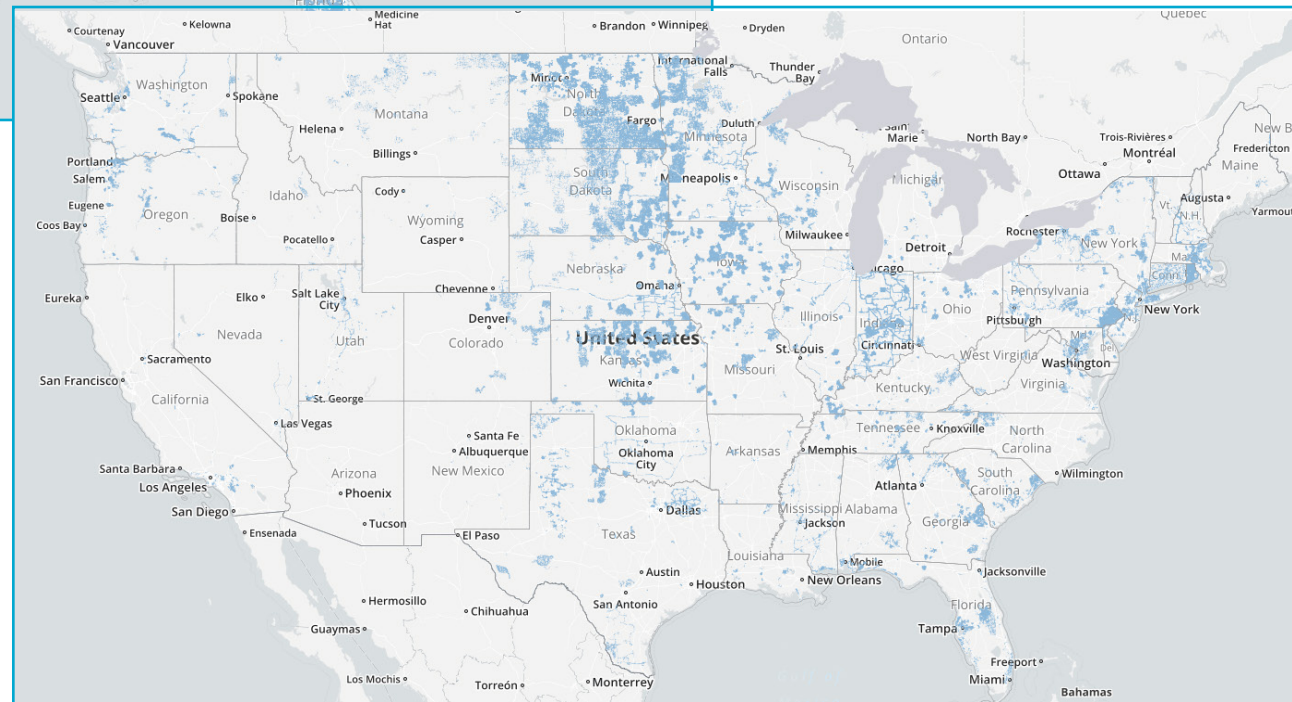
Source: (U.S. Department of Agriculture, 2011; Griffin, 2015)



Map 1.1: FCC national broadband map of service availability, including DSL, Cable, Fiber (Left).

Map 1.2: FCC national broadband map of service availability, only fiber-optic connection to end users (Below).

Source: (Federal Communications Commission, 2010)



on broadband service and disseminating best practices. The National Broadband Map is a resource created by Connecting America to show the current broadband environment of the United States (Map 1.1 and Map 1.2). Data and resources are available to all types of organizations and levels of government to promote increased knowledge and understanding of the benefits of broadband.

Broadband connects residents and businesses to information, job opportunities, healthcare, and government resources. Non-governmental organizations recognize the societal benefits of expanding broadband and now offer resources and funding opportunities to do so. Connected Nation is a non-profit organization working with national and state agencies to create a platform for professionals and residents interested in advancing broadband services in their communities (Connected Nation, 2015). Connected Nation was founded in Kentucky in 2001 and became the preferred organization for broadband expansion planning 11 other states, including Iowa, by 2009 (Connected Nation, 2015). Connected Nation works with states to capitalize on broadband opportunities to take advantage of economic and social benefits.

Connect Iowa is a public-private partnership between Connected Nation and the Iowa Economic Development Authority. Connect Iowa works with Iowan communities and various agencies to advance broadband infrastructure development and adoption. Data and information is collected

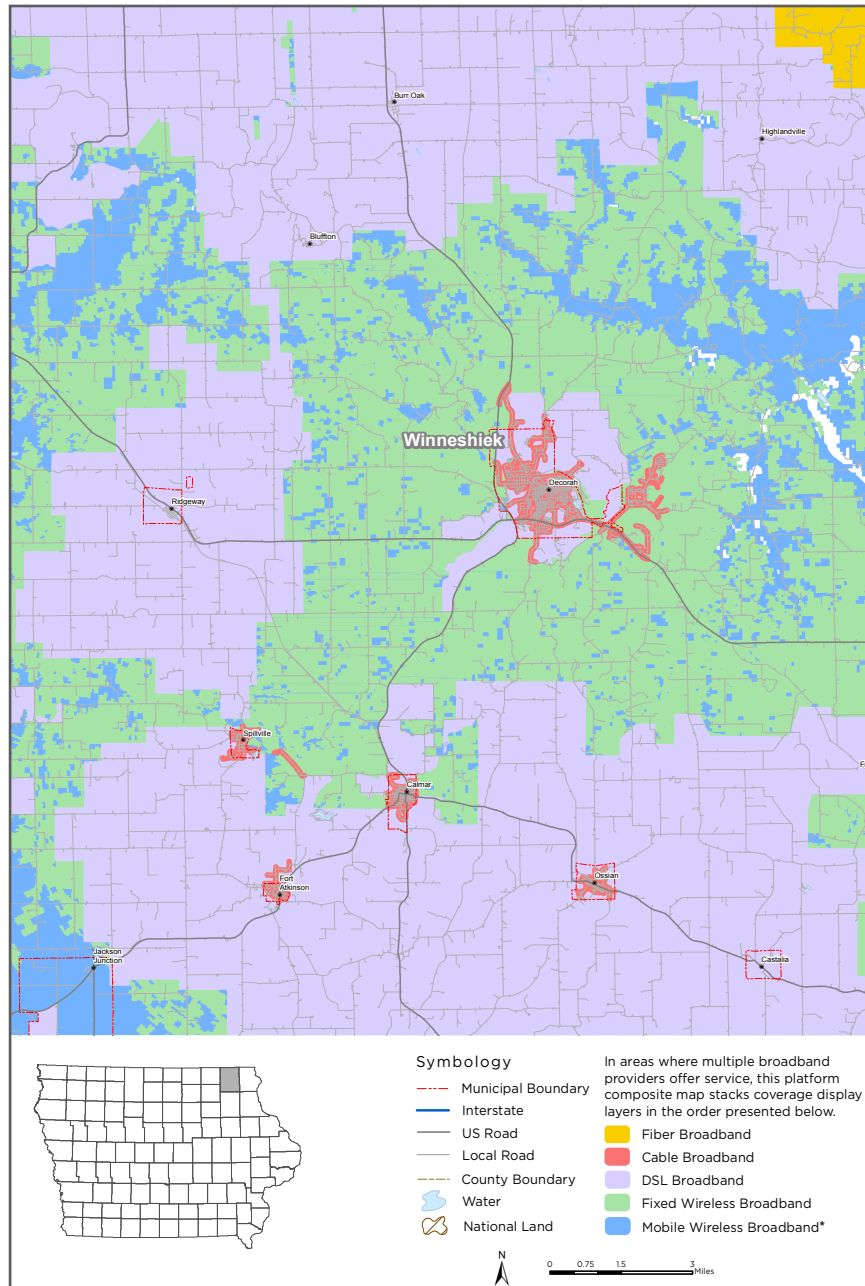
from providers to create resources and maps to illustrate the broadband environment in Iowa (Connect Iowa 2015). Connect Iowa collaborates with other agencies, such as the FCC and the Iowa Communications Network (ICN) to promote broadband adoption. ICN was established under the Iowa Telecommunications and Technology Commission (ITTC) and together they work to establish a statewide fiber-optic network to create the highest quality environment for learning, health, and government activity (Iowa Communications Network, 2014). This coordination in Iowa illustrates the national and state interest in promoting broadband opportunities. However, many barriers and challenges must be addressed to reach these aspirations and achieve an equitable and financially feasible broadband network.

Rural communities in the United States have disproportionately suffered in regards to developing high-speed, fiber-optic broadband. Similar to the REA, a lack of economies of scale and high-cost of last mile connections have prevented many private agencies from extending service to reach rural users. Due to the profit driven nature of private telecommunications companies, the high cost of investment to rural areas discourages the expansion of their networks and leads to gaps in service. It then becomes the burden of local governments and community organizations to provide equal access to internet services (Executive Office of the President 2015).

## 1.2 Fiber-optic Characteristics & Advantages

Fiber-optic cable contains a glass fiber in a protective tube, which transmits data using light waves. It can be buried below-ground or hung above-ground, similar to electrical lines. Fiber-optic cable is the preferred technology for transmitting data due to its ability to transmit information at previously unreachable speeds over long distances without interference. Commercially available fiber-optic networks have shown to produce data speeds as high as 111 gigabytes per second, but 10 to 40 gigabytes per second is more common (Alfiad, et al., 2008). Fiber-optic cable is considerably less expensive when compared to other available technologies; such as DSL and coaxial cable (The Fiber Optic Association, 2014).

Digital Subscriber Line, more commonly known as DSL, uses copper wiring to transmit data through acoustic waves. DSL is currently being phased out due to its inability to transmit data over long distances and its slow speeds. Coaxial cable is another popular technology used to transmit data. While the technology is not affected by distance, it is susceptible to signal interference and leakage. Leakage is the loss of energy during transmission from one point to another over long distances. The copper shield used around the coaxial core can be easily disrupted by other magnetic technology and may leak signal due to holes in the shield. The development of the landline telephone system resulted in coaxial cable becoming the



Map 1.3: Connect Iowa map of Winneshiek County internet service  
Source: (Daack, 2015)



most common wiring type in homes and businesses. Coaxial cable can be connected to fiber-optic cable to save costs, but speed is sacrificed as a result.

A significant advantage of fiber-optic cabling is the ability to expand capacity with an end-point equipment change instead of laying new cable infrastructure. There is no need to replace the in-ground or strung fiber cabling. This greatly reduces the cost of broadband infrastructure upgrades. Since fiber-optic cable uses light to transmit data, the light can be delivered in different wavelengths to increase the capacity. The end use equipment divides the light into multiple wavelengths to increase speed and capacity. There is no need to replace the in-ground or strung fiber cabling.

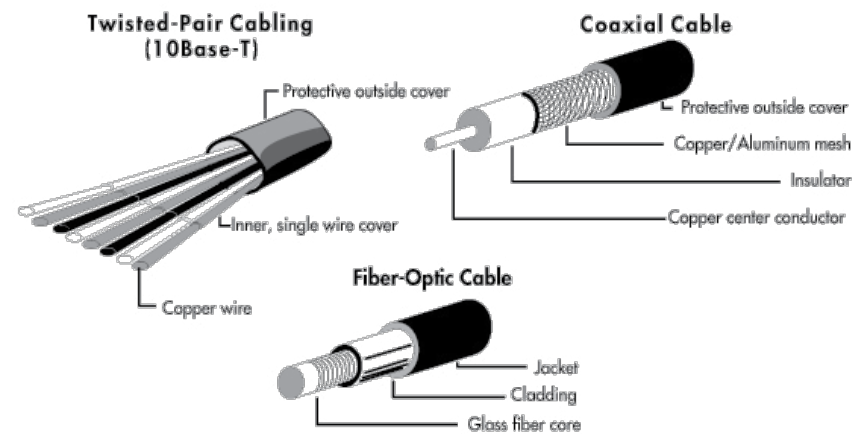


Figure 1.2: Telecommunications cable technology.  
Source: (Novell, 2015)

## Environmental Impacts of Fiber-Optic Technology

The direct environmental impacts of implementing a fiber-optic telecommunications network are low considering the re-usability of the rubber, glass, and metals in the physical structure. The end point equipment to transfer the light is also re-usable with e-cycling programs available in Winneshiek County (Winneshiek County, 2015b).

The majority of the environmental impacts associated with fiber-optic networks is indirectly related. Telecommuting is an indirect impact seen by the introduction of affordable, reliable, and high-speed internet services. Telecommuters, whether full-time or periodic, reduce the amount of congestion and carbon emissions from driving to a workplace. Telecommuting does have some negative environmental impacts. The increased number of electronic devices would have negative environmental impacts as they consume electricity from non-renewable sources. Fortunately, those negative impacts could be offset by the positive impacts from decreased car use. Therefore, the total indirect environmental impact is low.



Figure 1.3: Upper Iowa River - Decorah, Iowa. Source: (Author)

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## 1.3 Profile of Winneshiek County & Decorah

Winneshiek County, located in northeast Iowa, is characterized by rural, agricultural landscape. It is famous for its rocky bluffs, scenic trails, Norwegian influences, trout fishing, and large seasonal population of bald eagles. Named after a prominent chief of the Winnebago Indians, the region was settled by European Americans in 1847 (Alexander, 1882). A few years after settlement, the City of Decorah was voted to be the County seat (Alexander, 1882). Luther College set down roots in the town shortly after the city's inauguration, (Alexander, 1882). According to the U.S. News high school ranking system, Decorah High School received a silver medal, and was ranked the 4th best high school in the state (United States News and World Report, 2015).

With just above 21,000 people in the county, the region suffered a loss of population after the 1980s, following a trend that impacted most of rural Iowa (U.S. Census Bureau, 1980). However, the County has seen an increase in population through the 1990s, and remained relatively stable in the past decade defying rural trends (U.S. Census Bureau, 1990). The total number of occupied households in Winneshiek was 7,997 in 2010 (U.S. Census Bureau, 2010). The City of Decorah contains 2,885, or 36% of the households of Winneshiek County (U.S. Census Bureau, 2010). The median household income for the county was \$53,122 in 2013, 2.5% higher

than the state average (2013 American Community Survey 5-year estimates). Despite the agricultural dominance of the landscape, only 2.0% of the population is employed in the farming sector (U.S. Census Bureau, 2014). The majority of the county population is employed in one of three sectors: “management, business, and other financial occupations” sector, the “professional and related services” sector, or the “office and administrative support occupations” sector (U.S. Census Bureau, 2014).

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## 1.4 Scope of Work

The scope of our work was a collaborative effort between the Iowa Initiative for Sustainable communities, the DMN board, faculty advisors, and field problems team members. Our team assessed current network conditions, including financial history, organizational structure, and current spatial extent. A county-wide survey, interviews, and visioning session collected community feedback, to provide a snap-shot of current internet connectivity, access, and demand. An analysis of strengths and weaknesses of the DMN's organization type and network management policies was performed. Investment scenarios were developed to identify various future network expansions. These scenarios were based on our research, community input, and collaboration with the DMN board. An evaluation of future scenarios and organization types informed our final recommendations. Recommendations include a best-fit investment scenario, organizational structure and funding opportunities. An implementation plan accompanies the recommendations, as a strategic approach to achieving future goals. The implementation and evaluation plans consists of action items and suggested responsible parties to advance the development and adoption of broadband throughout the county.

## Project Goals

### Goal One:

#### Assess

- Assess current connectivity, capacity, and community needs
- Assess DMN's financial history and current standing
- Characterize DMN's organizational structure

### Goal Two:

#### Research

- Identify opportunities to serve new users in the county and to extend service to underserved rural residents and businesses
- Identify opportunities to connect to nearby municipalities and institutions, as well as greater Winneshiek County
- Estimate potential local and regional financial requirements for expansion of the DMN network. This includes buy-in for new members and social benefits

### Goal Three:

#### Evaluate

- Establish criteria for analysis and evaluate each scenario
- Explore legal barriers, liabilities, and opportunities for organizational partnerships

### Goal Four:

#### Recommend

- Recommend investment scenarios that meets the DMN and community goals
- Recommend potential organizational relationships and amendments to the current system
- Recommend implementation and evaluation plans



# Chapter Two

## CURRENT NETWORK CONDITIONS

2.1 Fiber-optic Infrastructure

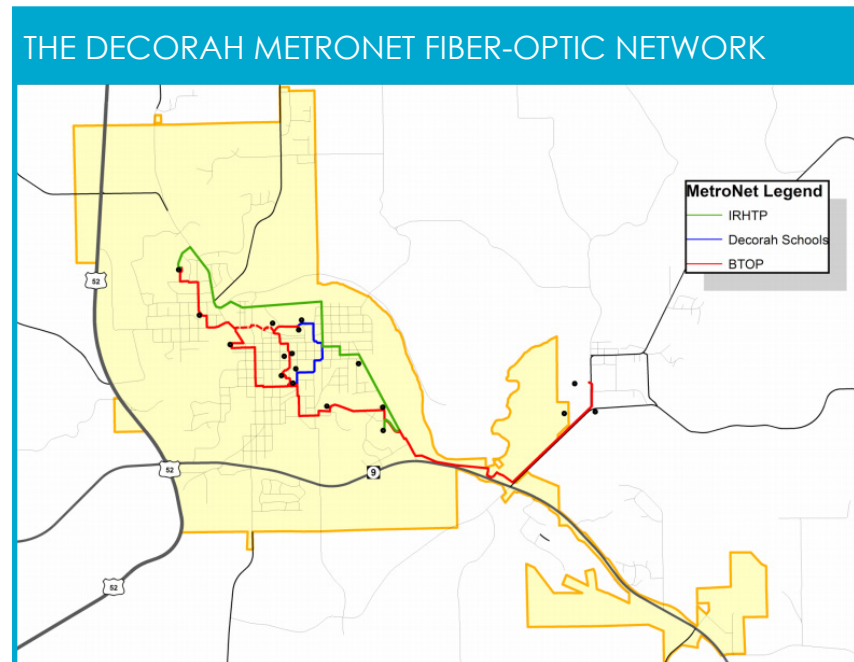
2.2 Current Organization Structure

2.3 Current Financial Summary



## Overview of the Decorah MetroNet

In 2010, six public and private organizations in Winneshiek County created an organization through a 28E agreement to meet the need for affordable, high-speed internet. Together, they developed a fiber-optic network known as the Decorah MetroNet (DMN). The six members are Winneshiek County, the City of Decorah, Decorah Community School District, Luther College, Winneshiek Medical Center, and Upper Explorerland Regional Planning Commission. The current network serves seventeen sites, all owned by the DMN members. The decision to form a new organization and network resulted from the lack of affordable, reliable internet service.



Map 2.1: The MetroNet fiber-optic backbone - Decorah, Iowa. Source: (Upper Explorerland Regional Planning Commission, 2012a)

## 2.1 Fiber-optic Infrastructure

The DMN network is a fiber-optic backbone, ring system. The benefit of a ring network is to provide redundancy in service, which prevents long periods of interrupted service. The fibers are bundled together into cables of 36 to 72 strands of fiber, extending 11 miles. The network is within the City of Decorah, serving seventeen sites owned by 28E members. The fibers are either strung above ground on electrical poles or in-ground in road right-of-ways. In the future, the in-ground deployment of fiber is preferred because it reduces potential damage to the infrastructure.

Each member of the DMN network is afforded two strands of fiber for each facility. The system supplies 2GB of data capacity that is purchased from private providers in the area. There are two entry points for internet service at the Decorah Community School District and Luther College. The internet access points allow for the internet service providers entry to the system to provide internet connection.

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## 2.2 Current Organization Structure

DMN is a joint agreement between the six anchor members organized under Iowa Code 28E. An Iowa 28E is a type of organizational agreement between governments and other entities to provide a public service. All members are public, quasi-governmental, or non-profit entities. The DMN's mission is to provide cost-effective telecommunications through a fiber-optic network. The DMN has operated under its current agreement since December 2010. The agreement is an indefinite agreement that can only be dissolved by unanimous vote.

The network and organization is managed by a board of representatives. Each anchor member is allowed one representative with one vote. The board is responsible for overseeing the planning, installation, and maintenance of the network. The board must have a voting majority to accomplish a given motion or resolution. Additionally, the 28E partnership maintains ownership rights of the physical network.

Financially, each anchor institution contributes equally to the organization to stay in good standing. If a member fails to meet the minimum payment or chooses to leave the agreement, the member forfeits all previous payments and ownership rights. The 28E partnership also receives funds from Indefensible Rights of Use (IRU) contracts. The IRU contracts are agreements for the use of dark fiber by non-partnership entities.



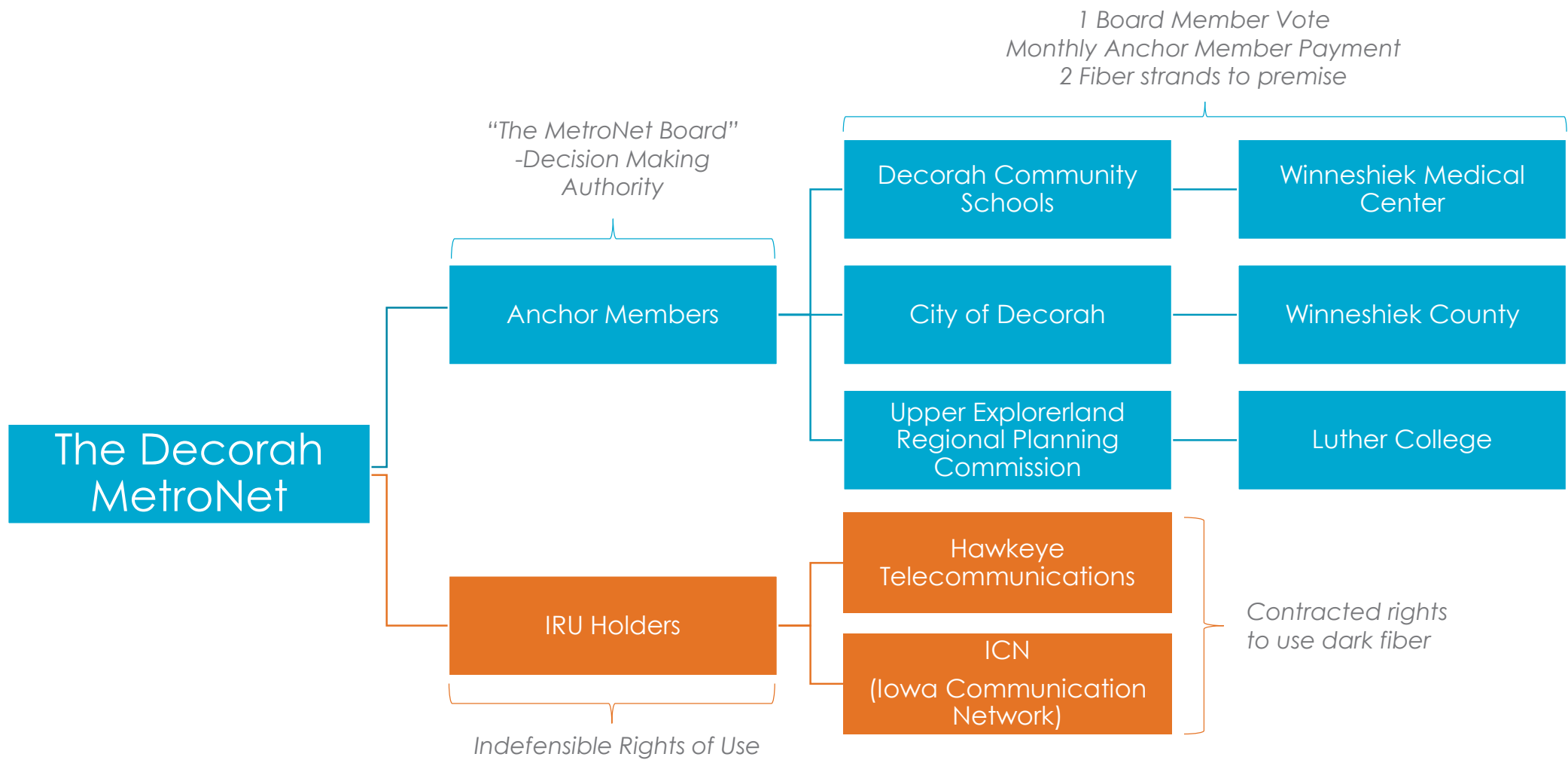


Figure 2.1: Decorah MetroNet's organizational structure

## 2.3 Current Financial Summary

### Methodology

The financial profitability of DMN was analyzed to understand the organization's current financial standing. The financial profitability is represented by two variables; break-even point, and the Internal Rate of Return (IRR). The calculations and in-depth methodology can be found in Appendix 1.

### Initial Investment

Initial investment began between 2010 and 2015. The cost of construction was covered by a Broadband Technology Opportunity Program (BTOP) grant from National Telecommunications and Information Administration (NTIA) and DMN partner contributions. The BTOP grant provided 70% of the funds for the initial capital investment. The remaining 30% of the cost was divided equally between the five original anchor members, with Upper Explorerland Regional Planning Commission buying-in later.

Table 2.1 indicates total investment for the network build-out. Infrastructure installation includes the fibers, equipment to bury cabling, and labor. Equipment costs were comprised of switches, routers, and electronic components. Finally, engineering costs are those costs associated with the designing of the network by telecommunication engineers.

### Operation & Maintenance

Beginning in 2015, each anchor member now pays an annual fee of \$7,500 to cover operation, maintenance, management expenses, and internet service payments. There has been no new construction during this period.

Decorah MetroNet Financial Summary		
FY2010-FY2016		
Start-Up Period	<b>Fixed Cost</b>	<b>\$ 969,869</b>
	Infrastructure and Fiber Installation	\$ 742,670
	Equipment	\$ 128,335
	Engineering Service and Other Needs	\$ 98,864
	<b>Source of Financing</b>	<b>\$ 969,869</b>
Operation Period	BTOP Grant	\$ 519,869
	Six Anchor Members	\$ 450,000
	<b>Operating Cost</b>	<b>\$ 98,990</b>
	Repair and Maintenance	\$ 41,500
	Capital Improvements	\$ 35,000
	Management Expense	\$ 22,490
	<b>Annual Income</b>	<b>\$ 13,786</b>
	Hawkeye Telephone Company	\$ 9,600
Iowa Communications Network	\$ 4,186	
<b>Anchor Contributions</b>	<b>\$ 45,000</b>	
<b>Annual Cost Savings from Switching Services</b>	<b>\$ 94,680</b>	

Table 2.1: DMN Financial Status from Fiscal Year 2010 to Fiscal Year 2016  
 Annual Cost Savings: actual payments to previous internet service providers  
 \*Net Annual Cost Savings = Annual Cost Savings – Anchor Contributions  
 Source: DMN Budget FY 2016. (2015)

The DMN receives income from two IRU contracts. One is a 10-year, \$42,000 contract, paid upfront. The other is an 8 year contract with an annual fee of \$9,600 (DMN Budget, 2015).

In addition to IRU income, the DMN partners have experienced cost savings from entering the partnership and having access to the network. Table 2.1 contains the total cost savings, based on the difference between previous service payments and current contributions to the DMN fiber-optic network.

### Profitability Analysis

The first step to determine if the DMN system is profitable is calculating the break-even point. Table 2.2 indicates the break-even amount is over \$500,000. The break-even analysis assumes that all IRU payments and member contributions stay the same. Beginning in 2015, the time to break-even is slightly over 8 years.

The IRR is a commonly used measure of profitability for the initial investment. Over a 10 year time line, we find that the IRR is 1.82%, which means that for each dollar invested in the DMN you would receive \$1.018 back on the investment. The investment is considered profitable since the IRR is greater than 0%.

Both profitability tests indicate that the network is in good financial condition given that the network is only utilizing 40% of their total capacity. Therefore, the DMN is presented with an opportunity to expand their organization and network to include more users.

<b>Break-even Point</b>	
Fixed Cost	\$ 969,869
Break-Even Point at 1.75%	\$ 519,340
Years to cover fixed cost	8.26

Table 2.2: Break-even Point of DMN

<b>INTERNAL RATE OF RETURN (FY2010 –FY2024)</b>		
<b>Cash Outflow (Nominal Value)</b>	<b>Total</b>	<b>\$1,959,769</b>
	Start-up Cost	\$969,869
	Operating Cost	\$989,900
<b>Cash Outflow (Present Value, at 1.75% Rate)</b>	<b>Total</b>	<b>\$1,937,910</b>
	Start-up Cost	\$1,021,214
	Operating Cost	\$916,696
<b>Cash Inflow (Nominal Value)</b>	<b>Total</b>	<b>\$1,088,525</b>
	BTOP Grant	\$519,869
	Revenue	\$514,560
	Member Fees	\$450,000
<b>Cash Inflow (Present Value, at 1.75% Rate)</b>	<b>Total</b>	<b>\$1,097,889</b>
	BTOP Grant	\$566,978
	Revenue	\$114,189
	Member Fees	\$416,722
<b>Cost Savings (Nominal Value)</b>		<b>\$910,795.20</b>
<b>Cost Savings (Present Value, at 1.75% Rate)</b>		<b>\$843,441.38</b>
<b>Net Present Value, at 1.75% discount rate</b>		<b>\$3,419.79</b>
<b>IRR</b>		<b>1.82%</b>

Table 2.3: Internal Rate of Return of DMN



# Chapter Three

## COMMUNITY ASSESSMENT

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3.1 Residential Access & Demand

3.2 Business Access & Demand

3.3 Business Interviews

3.4 Community Visioning



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## Overview

The Decorah MetroNet (DMN) wants to include more users in the DMN network, but lacks information from user groups about their current levels of service, satisfaction, and interest in access to fiber-optic network. Four different community assessment tools were developed to measure the level of access, service, and the importance of internet to residents, businesses, and community leaders. Surveys, interviews, and a community visioning session were created to gain insight into the current state of broadband in Winneshiek County. The information collected helped identify key user groups in the expansion scenarios (Chapter 5) and formulate action items for the final implementation plan (Chapter 7).

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### 3.1 Residential Access & Demand

The goal of the residential survey was to assess access and connectivity of Winneshiek residents, as well as their demand for potential fiber-optic service. The survey was an important because the only data collected on this topic is from the FCC and Connected Nation, which uses self-reported data from internet providers. The survey provides a snap-shot of current satisfaction with service, trends in use, and how the internet at home is used for work purposes.

## Methodology

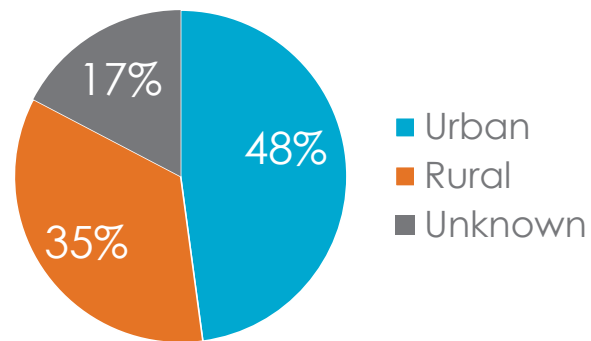
The survey was conducted from November 18th, 2015 to March 1st, 2016. Residents could access the survey online or on paper. Paper surveys were available at Decorah City Hall and public libraries in Decorah, Calmar, Fort Atkinson, Ossian, and Spillville. The survey was advertised in public spaces, local newspapers, radio interviews, water bills, and social media. The residential survey, advertisements, and deployment materials can be seen in the Appendix 2 and Appendix 3.

Early on, there was an over-representation from urban households in Decorah (households within the municipal limits of Decorah or Calmar). A randomized postcard advertisement was sent to 2200 rural households to boost rural response rates (Appendix 3).

A total of 484 survey responses were collected (398 of which were completed). 232 responses came from urban households, while 166 came from rural areas. After the survey was closed, the data was cleaned in preparation for statistical analysis. Survey responses were categorized as urban, rural, or non-applicable (those who did not respond regarding location). The data was analyzed using descriptive statistics, central tendency, hypothesis testing, test of two means (independent samples), test of proportions, Pearson correlation coefficient, and chi-squared testing.

## Key Findings


Contrary to our expectations, survey results found that urban and rural residents have almost the same access to the internet. However, rural residents have slower internet speeds and are significantly more dissatisfied with speed and capacity. This is likely tied to the use of satellites, often times the only option for telecommunications access in rural areas. Satellites are traditionally unreliable in heavy rains, snow, and other severe weather events. Urban and rural residents have a strong interest in receiving internet through fiber-optic lines. This was echoed as residents of the City of Decorah passed a referendum, with 94% of voters in favor, supporting a municipal telecommunications utility in November, 2015 (City of Decorah, 2015). The following charts, tables, and information summarize the key findings from the residential access and demand survey.






Proportion of responses, separated by location


Figure 3.1: Proportion of residential survey respondents from urban, rural, or unknown areas

## KEY FINDINGS

**95%**  **OF HOUSEHOLDS HAVE ACCESS TO INTERNET**

### AVERAGE HOUSEHOLD RESPONSE

-  Has a bachelors degree or higher
-  Has an income from 65k to 100k
-  Has ~5 devices connected to the internet at home

Rural residents have **30%**  **slower internet than urban users**

KEY FINDINGS

Urban residents pay an average of **33% more** than rural residents



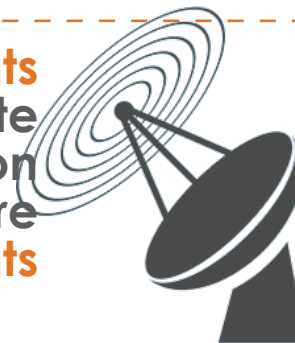
of residents use the internet at home for work purposes on a **daily** basis.



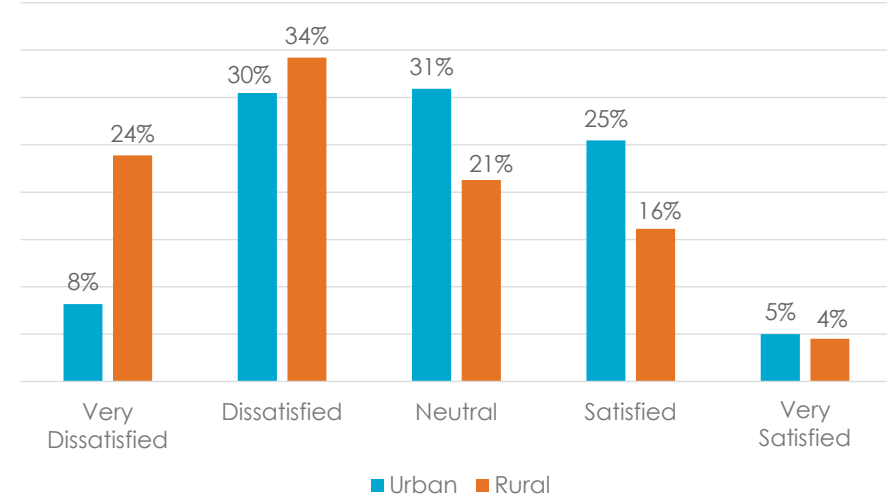
Rural residents have a significantly higher

**WILLINGNESS TO PAY**

Rural residents rely on satellite telecommunication significantly more than **urban residents**



Level of Satisfaction with current Internet services



Medium of Service

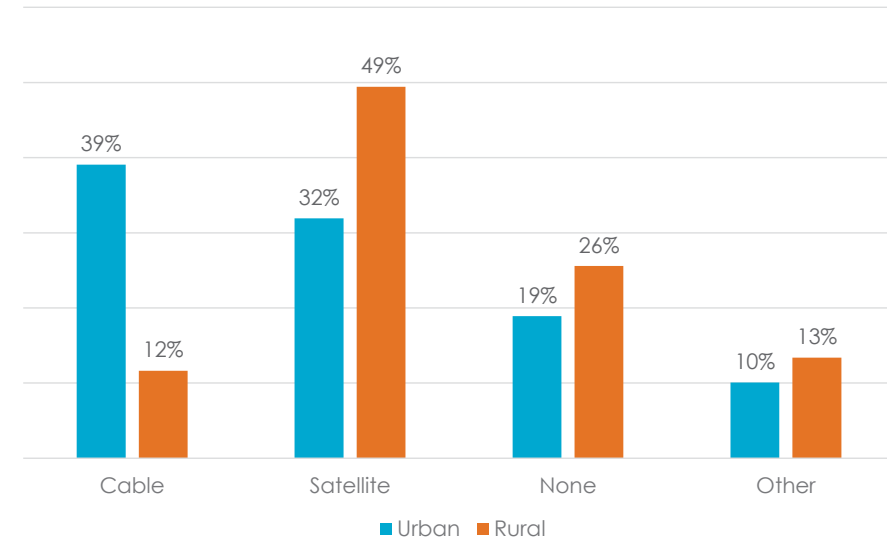


Figure 3.2: Graphs depicting levels of residential satisfaction (Top) and type of service (Bottom)

## Resident interest in Fiber-optic broadband

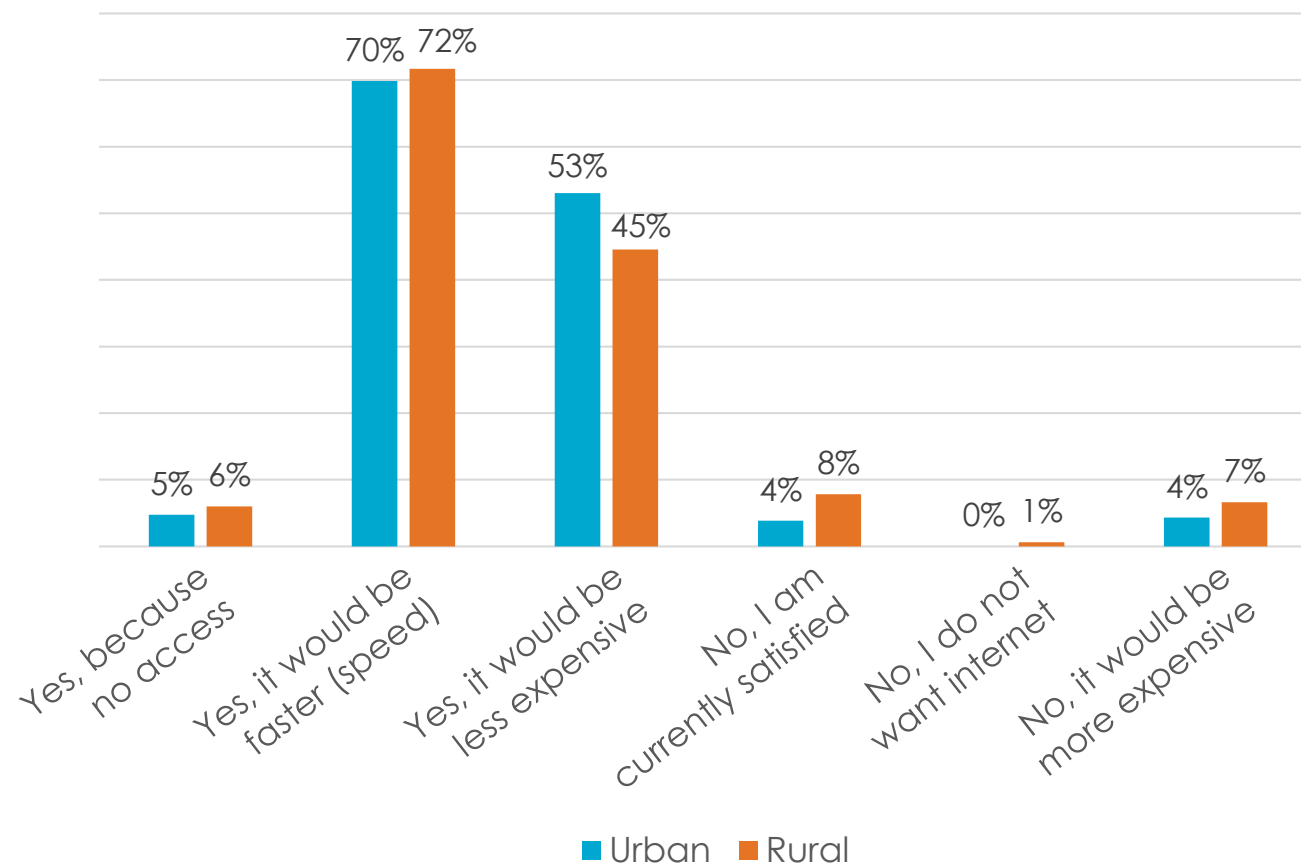


Figure 3.3: Residential household interest in and rationale for switching to fiber-optic internet service

### ADDITIONAL FINDINGS

- The level of satisfaction is dependent on the consumer's type of service (i.e. Cable, satellite, etc.) (90% confidence level)
- Willingness to pay has a weak, positive correlation with level of educational attainment and gross annual income
- Interest in purchasing fiber-optic internet services is dependent on the level of satisfaction (99% confidence level)
- Interest in purchasing fiber-optic internet services is dependent on the frequency of internet use at home for work purposes (90% confidence level)



## 3.2 Business Access & Demand

The Winneshiek County business survey was distributed to assess internet usage, speed, cost, and future demand among area businesses. The survey has helped determine scenario development and measure the importance of internet in everyday working environments. Major businesses who completed the surveys were also asked to participate in phone interviews to ascertain a qualitative narrative of digital assets in business, seen in Chapter 3.3.

### Method

The surveys were available from November 18th, 2015 to January 1st, 2016. The survey was distributed electronically through the Decorah Area Chamber of Commerce e-newsletter. The survey was also advertised in local newspapers and social media. A paper version was available at the chamber office in downtown Decorah (Appendix 4).

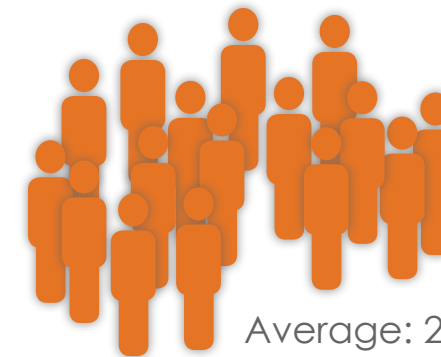
A total of 109 survey responses were collected. After the survey was closed, the data was cleaned in preparation for statistical analysis. Outliers were identified and inconsistencies were corrected. For key questions, response distributions were reviewed to find biases or skewed data. Confidence intervals were then calculated for key variables and variables with abnormally high standard deviation. The central tendency was analyzed for the key variables.

### BUSINESS RESPONSES



Average: 10 Employees

Small Businesses: 70 Responses



Average: 215 Employees

Large Businesses: 9 Responses

**98%** OF BUSINESSES HAVE  
INTERNET ACCESS

## Key Findings

The business survey results indicated that almost all businesses have access to the internet. Unlike the residential survey, we assumed the businesses would have more access due to larger budgets and the importance of internet in online business activities. Many of the businesses are currently satisfied with their level of internet service, but anticipate needing more internet capacity and speed in the next five years. The anticipation for more internet service may explain eagerness to switch to a fiber-optic service.

### Time to Next Needed Internet Speed Upgrade

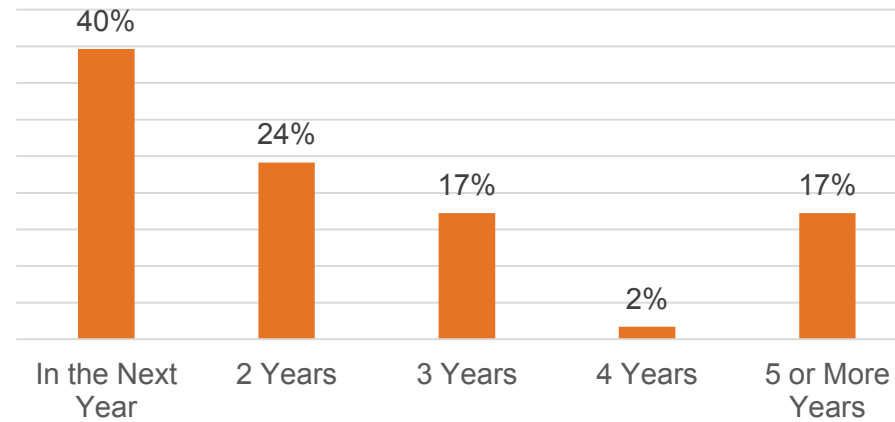


Figure 3.4: Percentage of businesses that need an internet service upgrade categorized by time to next upgrade

### Satisfaction of Current Internet Speed Business in Wineshiek

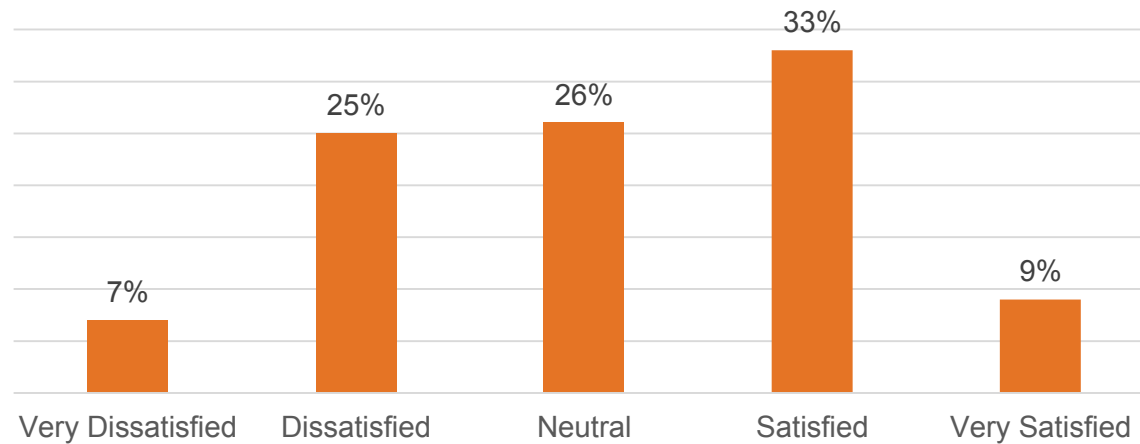


Figure 3.5: Business level of satisfaction with internet service capacity and speed

### Willingness to Pay v. Current Rate Business in Winneshiek

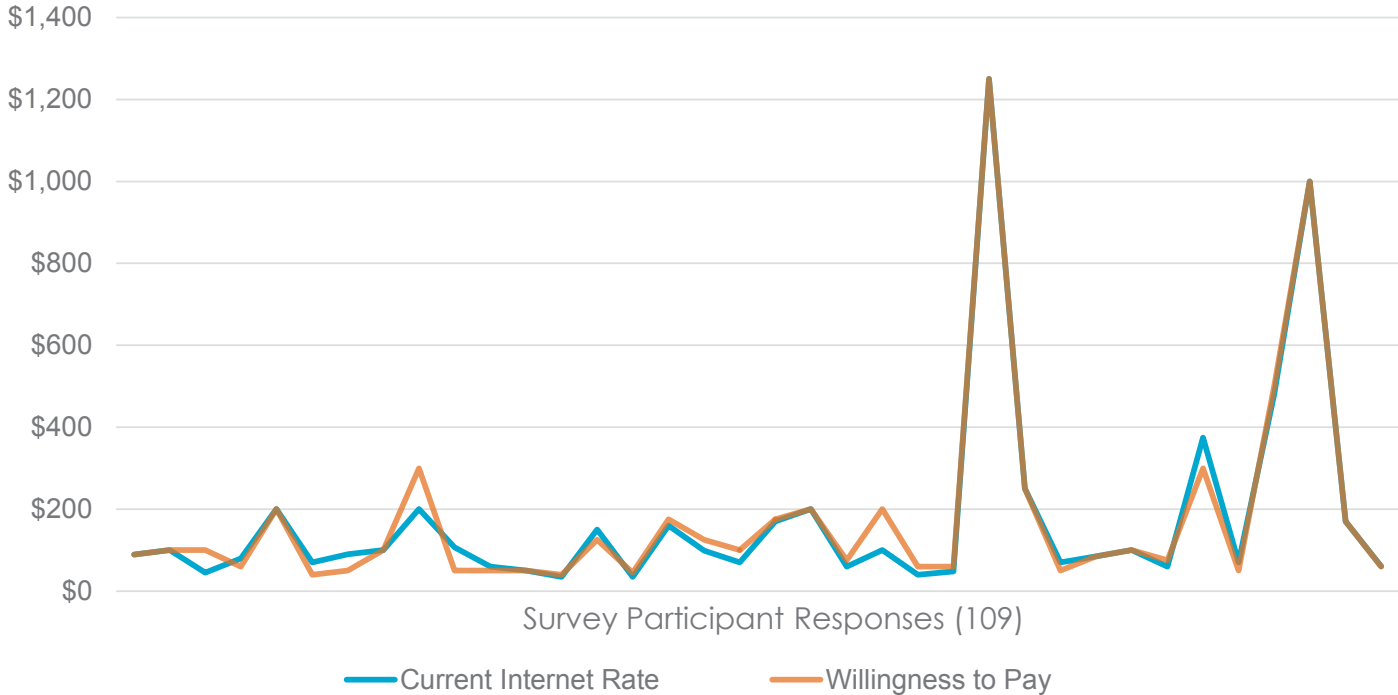


Figure 3.6: The current price businesses pay per month for internet service and their willingness to pay for fiber-optic services per month.

#### ADDITIONAL FINDINGS

<ul style="list-style-type: none"> <li>○ 57% of employees at both large and small businesses utilize the internet to complete work tasks</li> <li>○ 25% indicated they exceeded their data contract</li> <li>○ 32% of businesses are “very dissatisfied” or “dissatisfied” with their current level of speed and capacity</li> </ul>	<ul style="list-style-type: none"> <li>○ 77% of all businesses will need an upgrade to internet speed and capacity in the next 5 years</li> <li>○ 82% of all businesses are interested in fiber, 50% because they believe it would be faster, 32% because they believe it would be less expensive</li> </ul>
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### 3.3 Business Interviews

Major business interviews were conducted to gather qualitative data on business environment factors, workforce characteristics, and their relationship with internet service and digital skills. The DMN partnership, during initial meetings, expressed in improving the economic conditions in Winneshiek County. Historically, Winneshiek County has lost opportunities to attract new businesses due to a lack of internet capacity.

#### Method

The interviews were non-random, focusing on businesses with 40 or more employees. Of the 16 businesses identified, 5 participated in the interviews. The businesses were contacted through a business directory housed on the Winneshiek County Economic Development website. Interviews were semi-structured, conducted over the phone, with a script of questions to lead interviewees through business location factors, workforce needs, and the role of internet in the workplace. Script and other business interview materials can be found in the Appendix 5.



Figure 3.7: Team members, Qilu Chen and Dea Qatipi, conducting business interviews

## BUSINESS INTERVIEW FINDINGS

### Location Factors



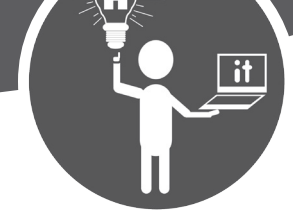
- The types of industries that participated in the interviews were education, manufacturing, banking, agricultural, and transportation & distribution.
- All of the businesses were sole locations or a primary branch.
- Business markets ranged from only local to global.
- Historically, businesses have located in Decorah for access to farmland, historical roots, and previous city attraction efforts.

### Business Environment



- The top three important business environment factors are; an educated and skilled workforce (educational attainment and technical skills), competitive land prices, and high-speed internet speed / connection.
- All businesses indicated a need to expand their market and online business profile.
- Business related costs, productivity, and business expansion plans are greatly impacted by the inability to access high-speed internet.

### Workforce Needs



- Workforce traits indicated as very important were; basic computer skills, teamwork, critical thinking, communication, leadership, and work ethic.
- 3 of the 5 businesses indicated it is difficult to find workforce with information technology support, web design, and management skills at reasonable wages.
- Businesses use an array of software and online tools for documentation, databases, financial reports, statistics, and 3D drafting.
- 50% of the businesses currently allow telecommuting and would encourage more if reliable, high-speed internet was available at homes

## 3.4 Community Visioning

A community visioning session was held in late January, 2016, to gather community input on future broadband expansion. Although the DMN is a collection of community focused organizations, outside community leaders were invited to express their opinions on the digital future of the region.

### Method

Community input was collected using a focus group format. A contacts list with individuals from four focus areas was used to distribute event invitations. The four focus areas were education, healthcare, equity/community development, and economic development. The participants were divided into small groups, comprised of various community sectors, at each table for the discussion. A group facilitator at each table led the group through questions about the future of Winneshiek County, community resources, and opportunities for growth. An in-depth methodology and questionnaires can be found in the Appendix 1 and Appendix 6. Participants were given an exit survey to collect general sentiments about the session and anonymous opinions on the visioning topics.

## Session Findings

Findings were collected from the four tables and summarized into common themes for analysis. On following page, key findings have been grouped into four main themes.



Figure 3.8: Visioning session attendees map out digital needs.

Residents, city officials, and community leaders discuss the future of broadband in the county. All groups indicated that Decorah, Freeport, and Calmar have more internet options than other parts of the county. The groups stressed the need for more rural broadband development.

## COMMUNITY VISIONING: KEY FINDINGS

### Future Community Conditions

- Steady population growth is expected in the county with a rising median age
- The community feels younger generation will only locate where internet is available
- Current diversity comes from Luther College, but there is a need to increase population diversity
- Participants agreed that the housing demand will increase, especially for “empty nesters”
- Tele-medicine will become more popular with an aging population
- Luther College and the school system are increasingly requiring students to take online instruction and e-textbook programs

### Economic Development

- County economy will continue to rely on farming, tourism, and service industries
- In the community’s opinion, broadband plays a crucial role in their work and life quality
- Telecommuting is and will continue to be popular with trailing spouses who move to the area and the millennial generation
- Consumers will utilize the internet to acquire goods and services outside their local area.
- There is interest in developing technology-based businesses

### Barriers & Hurdles

- Physical environment is an issue due to the spatial extent of the population and the topography of the area
- The cost to construct and maintain the network during and post-expansion is a concern
- Lack of information about fiber and benefits could limit the amount of people accessing broadband internet
- Lack of experience with technology could discourage aging and inexperienced users who may benefit the most from broadband
- Legal uncertainty about municipal broadband may inhibit expansion

### Opportunities

- There is high community interest and optimism for broadband development
- The DMN board is considered a community asset for future development
- The formation of a public utility could help broadband expansion
- To meet the education and technological skill gap, participants highlighted Luther, Northeast Iowa Community College, and local schools as organizations to increase knowledge and use of broadband.
- Cooperatives and state level agencies could become bigger partners

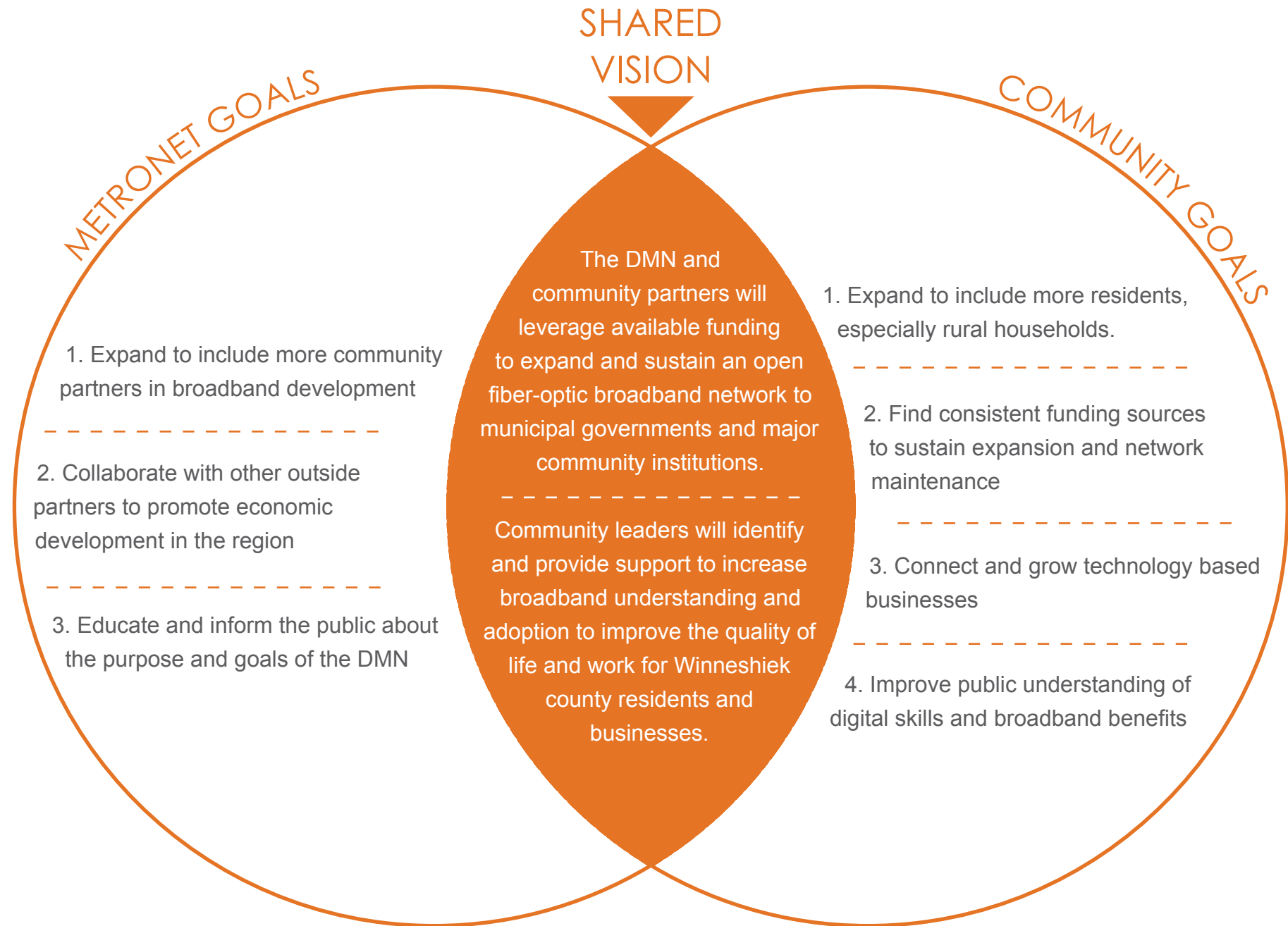
## Results

Based on the findings of the visioning session, it became apparent that there is a disconnect between the DMN goals and community expectations. The community sees the DMN as the leading force for broadband development in Winneshiek County. The DMN feels it is one of many community leaders in broadband development, but cannot take sole responsibility. On the following page, statements and goals were developed from the visioning session findings. The goals of the DMN board were developed based on a meeting with board members following the visioning session.



Figure 3.9: Winneshiek County community leaders participating in the visioning session (January, 2016)







# Chapter Four

## ORGANIZATIONAL ASSESSMENT

4.1 Iowa's 28E Partnership

4.2 Open Access Model

4.3 A Tiered 28E, Open Access Network



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## Overview

The Decorah MetroNet (DMN) board has expressed the desire to maintain their 28E partnership, and collaborate with other possible entities for the expansion of their fiber-optic network. As the network grows, the DMN board can take advantage of the flexibility in the 28E agreement to adapt their organizational structure. Professional and expert advice was collected to identify strengths and weaknesses of the DMN partnership. Best practices were identified that could apply to the DMN organizational structure. The analyses in this chapter could be applied to a number of organization types if the DMN wishes to change in the future.

## Methodology

Secondary research was conducted alongside case study analysis to identify key features and best practices for 28E partnerships in Iowa and open access policies. Professionals were contacted in the fields of infrastructure engineering, municipal administration, telecommunications utility management, and state telecommunications law. Each interview elicited advice on the strengths and weaknesses of a variety of organizational structures concerning liability, amendments, and decision-making power. An overview of our interviews with experts can be found in Appendix 1 and Appendix 7.

### Special Thanks

A special thanks to those professionals who volunteered their time to assist our team in strengthening this project through their expert opinions and advice.

Jeff Schott, MA // *Director of the Institute of Public Affairs at the University of Iowa*

Richard Fosse // *Former Director of Public Works for the City of Iowa City*

Curtis Dean, MA // *Broadband Services Coordinator at the Iowa Association of Municipal Utilities*

Robert Houlihan, MIS // *Director of Communication Services at Cedar Falls Utility*

Ivan Webber, J.D. // *Attorney and Shareholder at Ahlers Cooney, P.C.*

## 4.1 Iowa's 28E Partnership

An Iowa 28E is a type of organizational agreement between governments and other entities to provide a public service. Iowa established the 28E agreement for state and local governments to join powers with each other and other organizations to better serve their communities. These partnerships allow for more effective and efficient provision of services through the sharing of resources and cost distribution.

The flexibility of the 28E agreement allows for the adoption of various organizational and management structures. 28E partners determine key components of the agreement, such as purpose, duration, procedures, and financial structure. Experts identified the advantage of drafting a 28E agreement with varying levels of membership and fees to promote greater partnership opportunities.

### 28E Organization

#### Strengths

- Allows for constructive public or private partnerships
- Multiple public or private entities can be partners under one 28E agreement
- Flexibility for determining organizational structure, purpose, and financing
- A 28E agreement can establish a separate legal entity to carry out specific tasks

#### Weaknesses

- Funding is limited because a 28E partnership cannot directly apply for loans or excise taxes
- Changes to the 28E agreement require filing with the state, which can take time
- 28E partnerships are limited to the powers that exist within all member entities

## 4.2 Open Access Model

The open access framework refers to the access or use of network infrastructure or services, provided through transparent and non-discriminatory terms (OECD, 2013). Access to the network is offered through a standardized price scheme on equal entry terms across the entire network. Therefore, any entity has the ability to open a contract for access, as long as there is available capacity in the network. The owners of the network set capacity based on the total amount of infrastructure it wishes to contract out. This plays a crucial role in encouraging healthy competition between service providers. The process is most effective when there are standardized terms and pricing.

### City of Spencer, Iowa // Case Study

Residents of Spencer Iowa decided to create a city owned telecommunications utility to meet the need for affordable, high-speed internet service. Spencer Municipal Utility did have initial growing pains competing with multiple incumbent providers.

In 2000, Spencer Municipal Utility entered a legal battle with Mediacom LLC. (Mediacom Iowa, LLC v. Incorporated City of Spencer, 2004). Mediacom indicated that Spencer Municipal Utility had an unfair advantage over Mediacom due to the ability to use electrical utility revenues for the construction of a communications network, the ability to construct and operate within city boundaries without the need of a franchise, and that the utility held some public documents private under trade secret laws. The courts ultimately ruled in favor of Spencer Municipal Utility.

The take away for the DMN is that incumbent providers can pose a risk to future development. Many times, incumbents will intervene if they are at risk of losing a customer base. The common trend is the incumbent entering legal battles to drain public funding and slow the development process.

## Open Access

### Strengths

- Open access encourages competition
- The process is transparent & non-discriminatory
- Limits market abuse by incumbent providers
- Limits potential litigation for unequal treatment

### Weaknesses

- The DMN cannot exclude any entity requesting access, if there is capacity in the network
- Competition exists between all network users

## 4.3 A Tiered 28E, Open Access Network

The Decorah MetroNet has stated that they plan to remain a 28E organization, and are open to modifications to encourage expansion. The flexibility of the 28E, in combination with an open access policy, can meet the needs of the expanding partnership. Changes to the current organization could include the restructuring of the membership into two tiers and adopting an open access policy to encourage more IRU holders.

### Tiered Membership

The 28E allows for the creation of different membership tiers. Currently, the partnership only has anchor members. Expanding membership may be useful to distribute cost to aid in expansion. The creation of an associate member would promote new membership through cost savings and network access. Associate members would pay 50% of anchor members, but only have ½ a board member vote and access to one strand of fiber, instead of two. This would present an opportunity for entities with limited finances, who are interested in joining the partnership. The tiers of membership would promote inclusion of new members and partnerships by providing an option to participate at a lower cost, with corresponding power and access.

### User & Providers

If DMN chooses to create an open access network, the DMN partners maintain full ownership of the network. Through open access, DMN provides equal access to dark fiber through IRU contracts. IRU contract holders could be: a city or county utility, cooperative, non-profits, private entities, or other municipalities in Winneshiek County. IRU contract holders would be responsible for arranging and negotiating access to internet services from telecommunications providers.

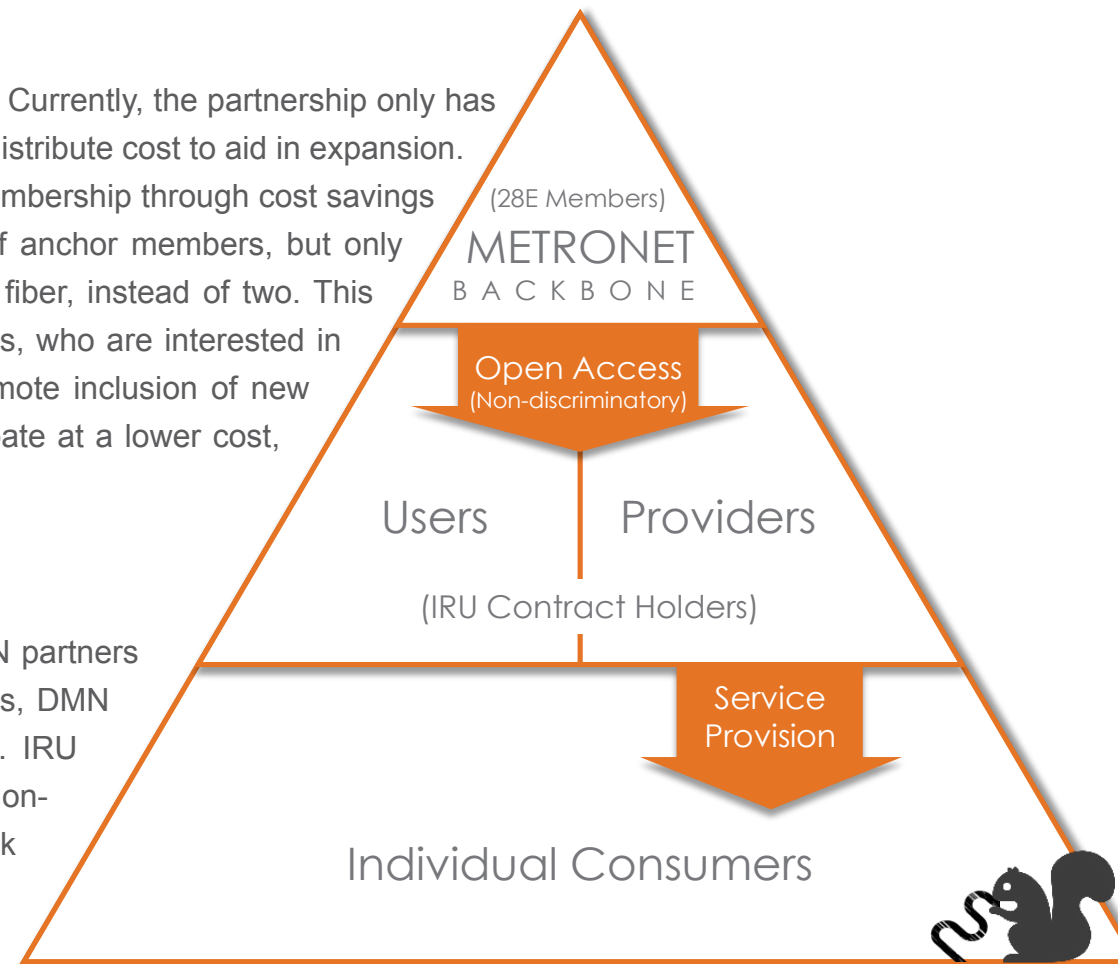


Figure 4.1: Access to the network and service provision under an open access policy  
DMN controls the backbone and offers IRUs to users and providers. The providers would then be free to offer internet service through the network.

## Indefensible Rights of Use

Indefensible Rights of Use (IRU) is a contracted agreement between the DMN network and organizations interested in using the dark fiber or fiber windows (Subramanian, 2003). The main benefit of an IRU contract is that it is exclusive and irrevocable, assuring a long-term partnership. Due to the conditions of the BTOP grant, DMN is unable to lease any part of the fiber-optic network, but it is allowed to contract access through an IRU. Currently, the DMN has two IRUs with local telephone and internet providers. The current IRUs have no use limitations on what contract holders can do with the dark fiber. Physical changes to the fiber-optic network is not included in the IRU contract. Moving forward, the language and limitations concerning IRUs in an open access model will be set by the board members, but must be equally applied to all IRU holders.

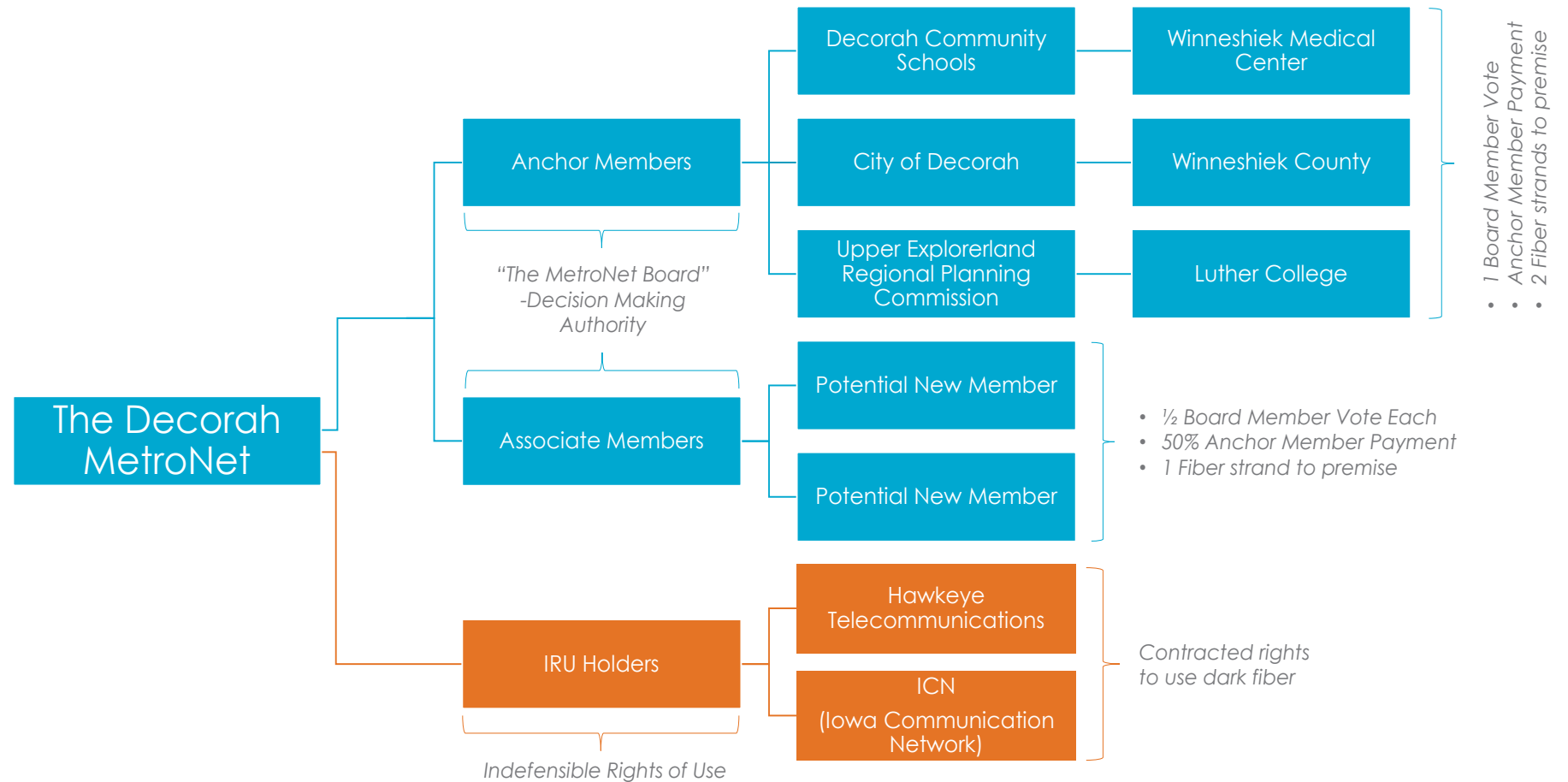


Figure 4.2: Decorah MetroNet's potential tiered organizational structure



# Chapter Five

## INVESTMENT SCENARIOS

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5.1 Scenario 1: No Change

5.2 Scenario 2: Residential Decorah

5.3 Scenario 3: Downtown Decorah Businesses

5.4 Scenario 4: Decorah Business Park

5.5 Scenario 5: Greater Winneshiek County





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## Overview

Investment scenarios were created to illustrate the spatial reach and determine the financial feasibility for the Decorah MetroNet (DMN). The scenarios aim to assess the physical build-out, financial feasibility, and social benefits of each expansion possibility. These scenarios serve as initial steps to achieving the long-term goal of expanding broadband access throughout the county.

The five scenarios were identified using information from meetings with the project partners, surveys, and the visioning session. The input from the project partners and community indicated five different target groups:

1. Current DMN members
2. Residents of Decorah
3. Downtown Decorah businesses
4. Businesses within the Decorah Business Park
5. Municipalities throughout Winneshiek County

All of the investment scenarios assume the DMN remains a 28E organization, adopts the tiered member system, and an open access policy. Each scenario contains a map describing the spatial extent of the scenario. A financial analysis for each scenario shows the cost of construction, available grants,

potential membership contributions, and indefensible rights of use (IRU) revenue. Finally, each scenario concludes with a list of direct and indirect social benefits associated with the network build-out.

### Methodology for Financial Analysis

The financial analysis is separated into two parts: cash outflow and cash inflow. Both parts are separated into two periods: construction and operation. The construction period is a 3 year build-out of the current network. The operation period is a 10 year time line post construction. Both time lines are based on the DMN's previous network build-out. Data used in the financial analysis calculations were retrieved from the City of Decorah and the DMN.

The cash outflow consists of all costs to the DMN. The construction period includes the construction cost, operations and maintenance, internet service, and cash reserves. The expansion costs include the cost of equipment, cost of fiber, underground speculating services, construction labor, engineering services, knifing/boring costs, and fiber testing. The operation and maintenance costs are based on the current 11 mile network. The cash outflow during the operation period includes operation and maintenance costs for the new network, internet service fees, and cash reserves.

The cash inflow includes all member contributions, grant dollars, and IRU revenues. The construction period for the

cash inflow are separated into all grant and no grant situations, creating a projected range of member contributions required for each scenario.

During the construction period, it is assumed that all new anchor and associate members pay the cost of constructing the new network. New members cover expansion costs, similar to the original anchor members during the initial investment. Each of the current members contribute the current annual rate of \$7,500 during the construction period. Associate members for both the construction and operation periods pay 50% of each anchor member contribution, as per Chapter 6.3 recommendations.

The cash inflow operation period includes member contributions and IRU revenue. The anchor member contributions were capped at a maximum threshold of \$15,000. The cap was created to lower the financial hardship on DMN members. The remaining difference between the cash inflow and outflow is distributed to the IRU income until the net cash flow equals zero.

### Potential New Members and IRU Contracts

The financial model assumes under these new organization conditions that there will be an increase in new members and IRU contracts. Membership for the 28E is restricted to non-profit, quasi-governmental, or governmental organizations.

Therefore, all new, potential members were one of these three organization types. A list of organizations was retrieved from the Decorah Area Chamber of Commerce (Decorah Area Chamber of Commerce, 2016). All organizations along each scenario build-out were considered associate members in the financial model. The only organizations considered potential anchor members were the City of Calmar and Northeast Iowa Community College based on conversations with the DMN board.

The new IRUs in each scenario are based on the total number of broadband providers in the build-out area. The broadband provider total is based on Connect Iowa data.

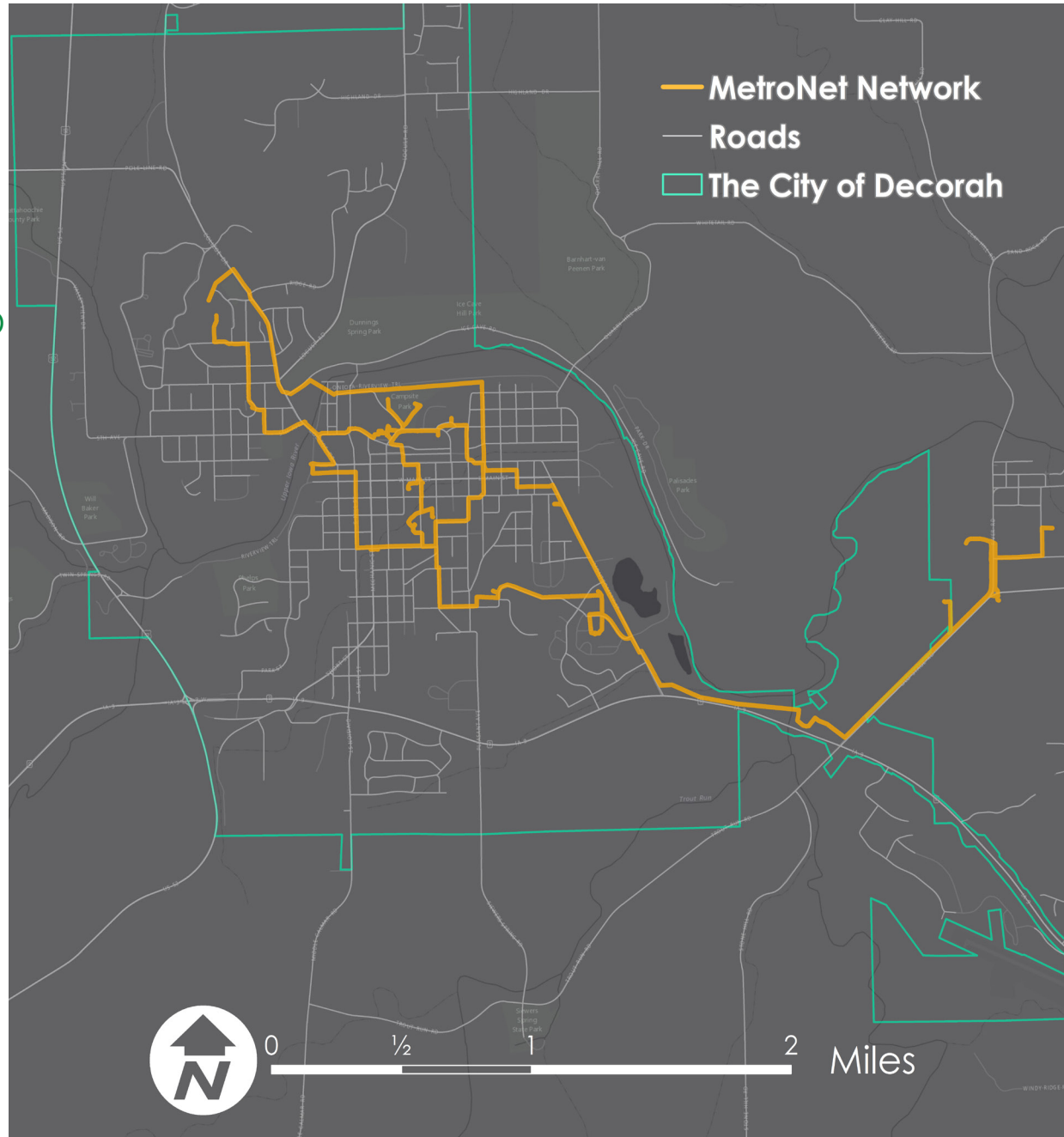
### IRU Break-Even

Since a large portion of the cash inflow operation period relies on IRU revenue, a break-even analysis was performed to identify the number of strands and length that would need to be contracted out to meet the cash inflow needs. The DMN has proposed opening 48 strands of fiber for IRU contracts,. Therefore, 48 strands is the maximum threshold for the break-even calculation. The IRU strands are presented in 1 mile increments unless the calculation exceeds the 48 strand threshold. If the strands exceed the threshold, then the mileage unit will change to 25% of the network after expansion. The break-even calculation uses the rate of \$125 per strand/per mile/month, which is based on market analysis (Appendix 11).



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No Change - SCENARIO 1



Map 5.1: The current extent of the DMN Network

## 5.1 Scenario 1 – No Change

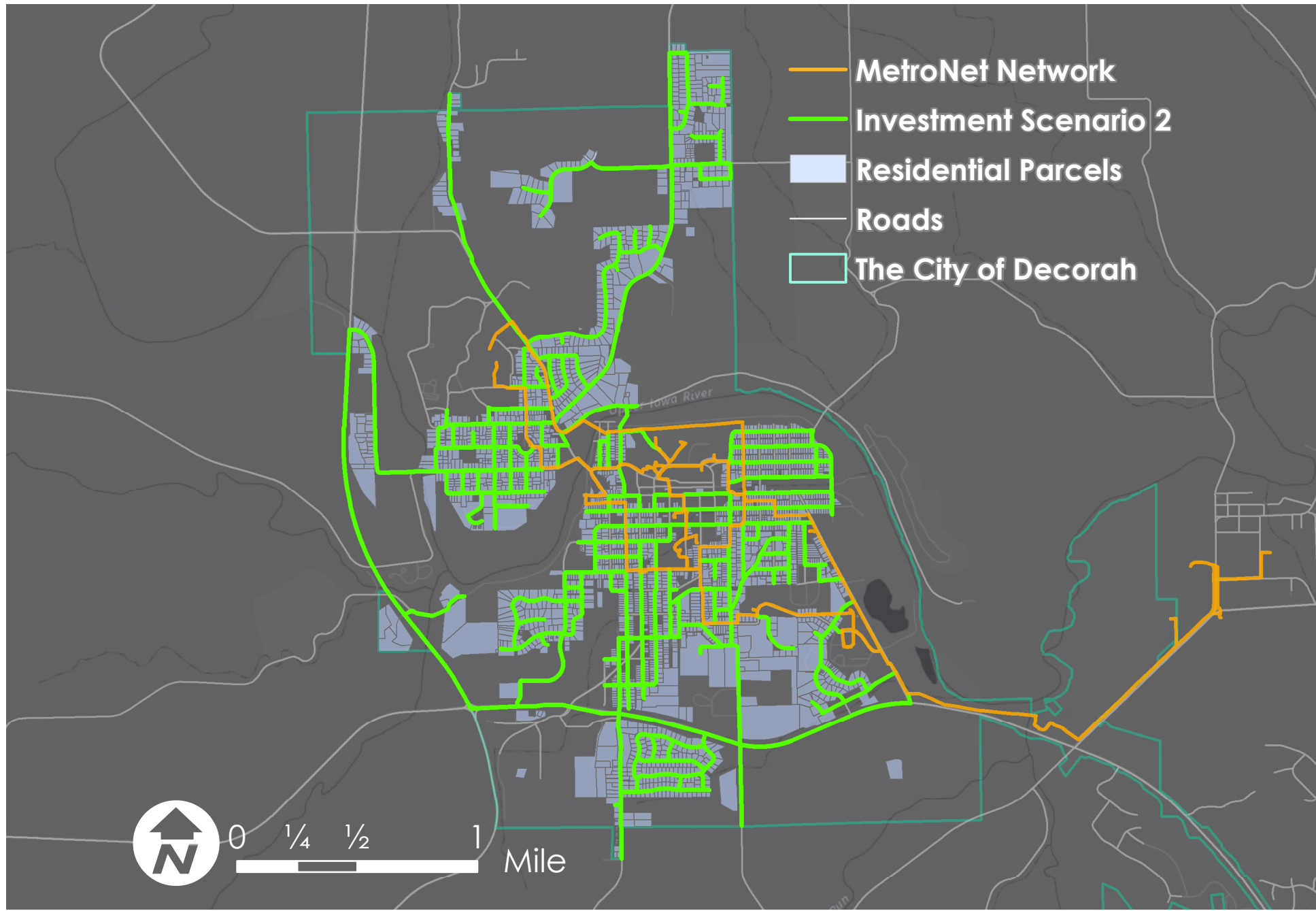
The no change scenario offers insight into the operations & maintenance (O&M) without physical expansion of the network. The purpose of the no change scenario is to serve as a control and comparison for the other scenarios. The target population in scenario one are the current DMN partners. The number of participants in Scenario 1 are five anchor members, one associate member, and three new IRU contracts. In each scenario, it has been assumed that one of the current anchor members will downgrade to associate member status.

Table 5.1 indicates the cash outflow and inflow. The only costs considered for this scenario are the O&M, internet services, and developing the cash reserve. The cash inflow maintains the anchor member contribution at its current rate and the remaining gap is to be covered by IRU revenue. With no construction, the DMN can begin collecting IRU revenue immediately under the new rate.

The social benefits for Scenario 1 are considered indirect benefits to the community. All of the DMN members offer valuable education, health, and governmental services. The community benefits from the increase in the types of services available online and the increase availability of information housed by these anchor institutions. The maintenance of the high speed internet service to these institutions could also increase the connectedness of residents and businesses with the government.

<b>Scenario 1 Financial Analysis FY2016-FY2025</b>	
<b>Capital Outflow</b>	<b>Annual</b>
Operation and Maintenance	\$ 98,990
Internet Service Payment	\$ 10,000
Reserved Cash	\$ 19,798
<b>Total Outflow</b>	<b>\$ 128,788</b>
<b>Capital Inflow</b>	
<b>Total Member Payment</b>	<b>\$ 37,500</b>
Anchor Member Payment	\$ 7,500
Associate Member Payment	\$ 3,750
<b>Current IRU Income</b>	<b>\$ 13,786</b>
<b>Estimated New IRU Income</b>	<b>\$ 73,752</b>
<b>Total Inflow</b>	<b>\$ 128,788</b>

Table 5.1: Scenario 1 Financial Analysis



Map 5.2: The residential build-out extends throughout the city to reach all residential parcels. The build-out includes redundant loops to prevent long periods of outages

## 5.2 Scenario 2 – Residential Decorah

The target users of Scenario 2 are residents of the City of Decorah. Information from the referendum, residential survey, and community visioning session indicate that residents are not satisfied with the current level of internet service, and the community sees a need for improving broadband service.

The network build-out consists of 38 miles of fiber connecting all residential parcels within the city. The build-out utilizes road right-of-ways, and does not include fiber to the premise (FTTP). FTTP is the connection of households to the backbone network. If FTTP is included in any scenario, the cost of construction would be too high for DMN to manage.

Table 5.2 indicates the cash outflow and inflow for Scenario 2. The number of participants in Scenario 2 is the same as Scenario 1 because the build-out remains inside the city limits and reaches only residents. Residents are unable to join the board or hold an IRU contract due to legal restrictions.

Unfortunately, potential grants cannot cover the construction cost of Scenario 2 (Table 5.3). Since the 28E organization structure is limited in financial acquisition, the 28E board would have to contribute a large amount of money to the construction of the new system. The lack of grants and the large amount of initial funding needed from board members makes Scenario 2 financially unfeasible for the DMN.

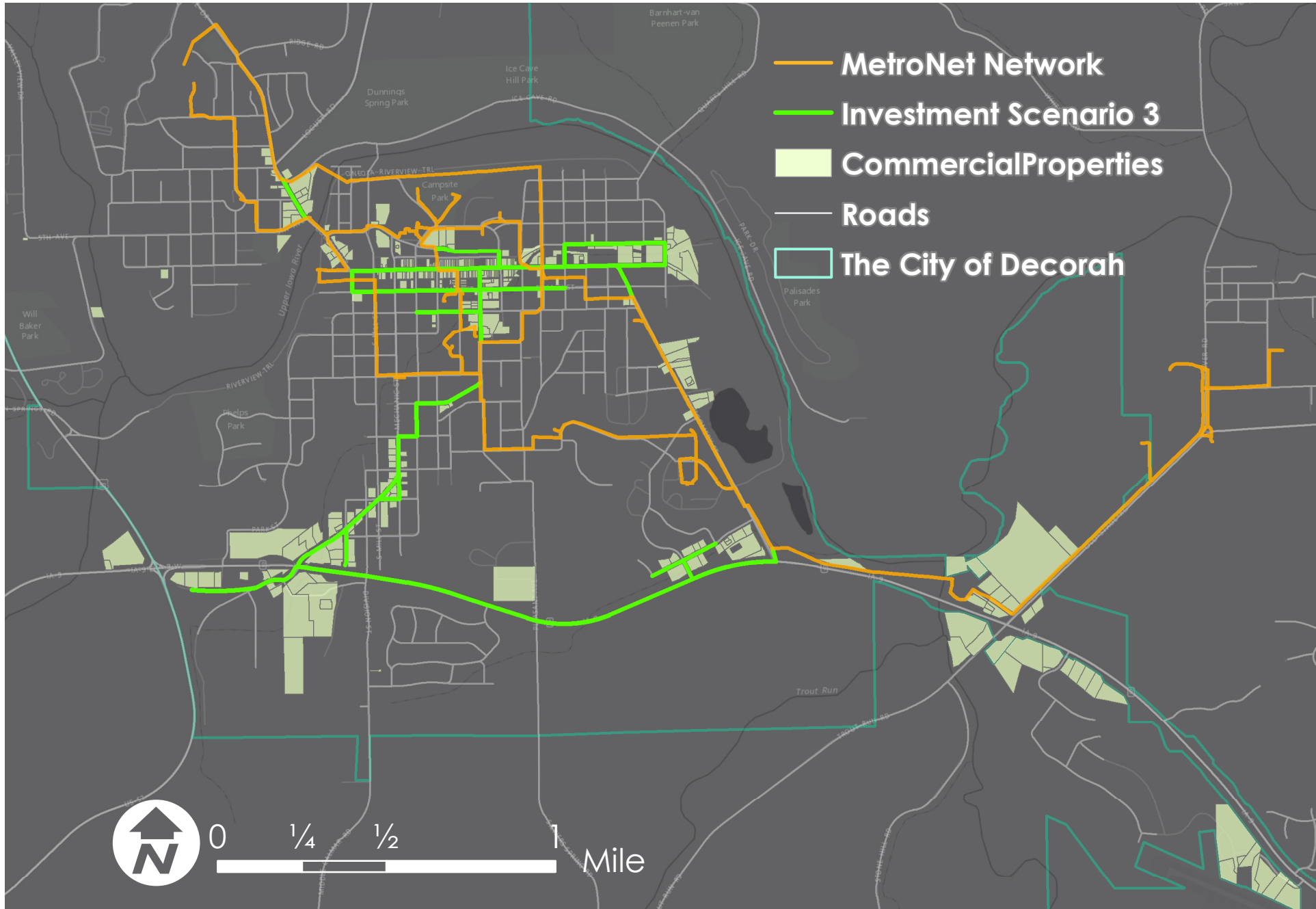
Social benefits that could be gained from Scenario 2 include direct benefits to households. Direct social benefits associated with this scenario include increased access to tele-healthcare, educational resources, and workforce opportunities.

<b>Scenario 2 Financial Analysis FY2016-FY2018 Construction Period</b>	
	Construction Period
<b>Capital Outflow</b>	
Expansion Cost	\$ 5,471,974
Operation and Maintenance	\$ 296,700
Internet Service Payment	\$ 30,000
Cash Reserve	\$ 59,340
<b>Total Outflow</b>	<b>\$ 5,858,014</b>
<b>Capital Inflow</b>	
<b>Grant</b>	<b>\$ 1,670,796</b>
<b>Total Member Payment</b>	<b>\$ 4,173,432</b>
Anchor Member Fees	\$ 758,806
Associate Member Fees	\$ 379,403
<b>Current IRU Income</b>	<b>\$ 13,786</b>
<b>Total Inflow</b>	<b>\$ 5,858,014</b>
<b>Net Capital Flow</b>	<b>\$ 0</b>

Table 5.2: Financial Analysis - Scenario 2

<b>Potential Grant Opportunities - Scenario 2</b>		
<b>Program</b>	<b>Agency</b>	<b>Grant Total</b>
Connecting Iowa farms, schools, and communities	USDA	\$ 820,796
Rural Business Enterprise Grants Program	USDA	\$ 500,000
Rural Business Opportunity Grants	USDA	\$ 100,000
Rural Community Development Initiative Grants	USDA	\$ 250,000

Table 5.3: Potential Grant Opportunities - Scenario 2



Map 5.3: The Scenario 3 network expansion reaches the business parcels of the City of Decorah



## 5.3 Scenario 3 – Downtown Decorah Businesses

Scenario 3 targets commercial businesses within the City of Decorah. Information from the business survey indicates that many of the Decorah businesses are unsatisfied with the current speed and capacity of their internet service. Many of the businesses indicated needing more internet capacity in the next five years. In addition to the business survey, DMN has prioritized economic development as a future goal, and the extension of service to commercial businesses would help spur economic activity.

The build-out will reach 120 commercial parcels with 6.2 miles of new fiber. The build-out will utilize road right-of-ways similar to the other scenarios. FTTP is not included in the total mileage or cost of the scenario.

The Scenario 3 cash outflow and inflow table indicates that the cost of construction could be covered entirely with grants, in a best case scenario (Table 5.5). If the DMN were unable to attain any grants, each new member would have to pay \$23,000 annually for three years. Some of the small businesses within Scenario 3 are non-profits, which could become associate members of DMN (Table 5.4). To cover a portion of the O&M costs of the expanded network, the DMN would need to contract at least 27, 1-mile strands of fiber (Table 5.7).

The direct social benefit associated with Scenario 3 is the increased access of small businesses to affordable, high-speed, broadband. Increased access would allow businesses to connect with online markets, expanding their market and selling outside of the local area. An increase in traded goods would bring outside dollars in the local economy.

Scenario 3 - Number of Participants		
	Construction	Operation
Anchor Member	6	5
Associate Member	16	17
Current IRU	2	2
New IRU	0	3

Table 5.4: Number of Participants - Scenario 3

Scenario 3 Financial Analysis			
FISCAL YEAR	Construction Period		Operation Period
	FY16-18		FY19-FY28
Capital Outflow	Total		Annual
<b>Expansion Cost</b>	<b>\$901,004</b>		<b>N/A</b>
	Total	Annual	Annual
<b>Operation and Maintenance</b>	<b>\$296,700</b>	<b>\$98,900</b>	<b>\$ 169,149</b>
<b>Internet Service Payment</b>	<b>\$30,000</b>	<b>\$10,000</b>	<b>\$ 10,000</b>
<b>Cash Reserved (20% of current O&amp;M)</b>	<b>\$59,340</b>	<b>\$19,780</b>	<b>\$ 33,830</b>
<b>Total Outflow</b>	<b>\$1,287,044</b>		<b>\$ 212,979</b>
Capital Inflow	Grant	No Grant	Annual
<b>Grant</b>	<b>\$901,004</b>	<b>\$0</b>	<b>N/A</b>
<b>Total Board Members Payment</b>	<b>\$135,000</b>	<b>\$ 135,000</b>	<b>\$ 58,636</b>
Anchor Member Annual Fee	\$ 7,500	\$ 7,500	\$ 11,727
<b>Total Associate Members Payment</b>	<b>\$209,682</b>	<b>\$1,110,686</b>	<b>\$ 99,682</b>
Associate Member Annual Fee	\$ 4,368	\$ 23,139	\$ 5,864
<b>Total Current IRU Income</b>	<b>\$ 41,358</b>	<b>\$ 41,358</b>	<b>\$ 13,786</b>
<b>Estimated New IRU Income</b>	<b>N/A</b>	<b>N/A</b>	<b>\$ 40,875</b>
<b>Total Inflow</b>	<b>\$1,287,044</b>		<b>\$ 212,979</b>
<b>Net Capital Flow</b>	<b>\$0</b>		<b>\$0</b>

Table 5.5: Financial Analysis - Scenario 3

Potential Grant Opportunities - Scenario 3		
Program	Agency Funds Available	
Rural Business Enterprise Grant Program	USDA	\$ 500,000
Rural Business Opportunity Grant	USDA	\$ 100,000
Rural Community Development Initiative Grant	USDA	\$ 250,000
Rural Cooperative Development Grant	USDA	\$ 200,000
Rural Business Development Grant	USDA	\$ 500,000

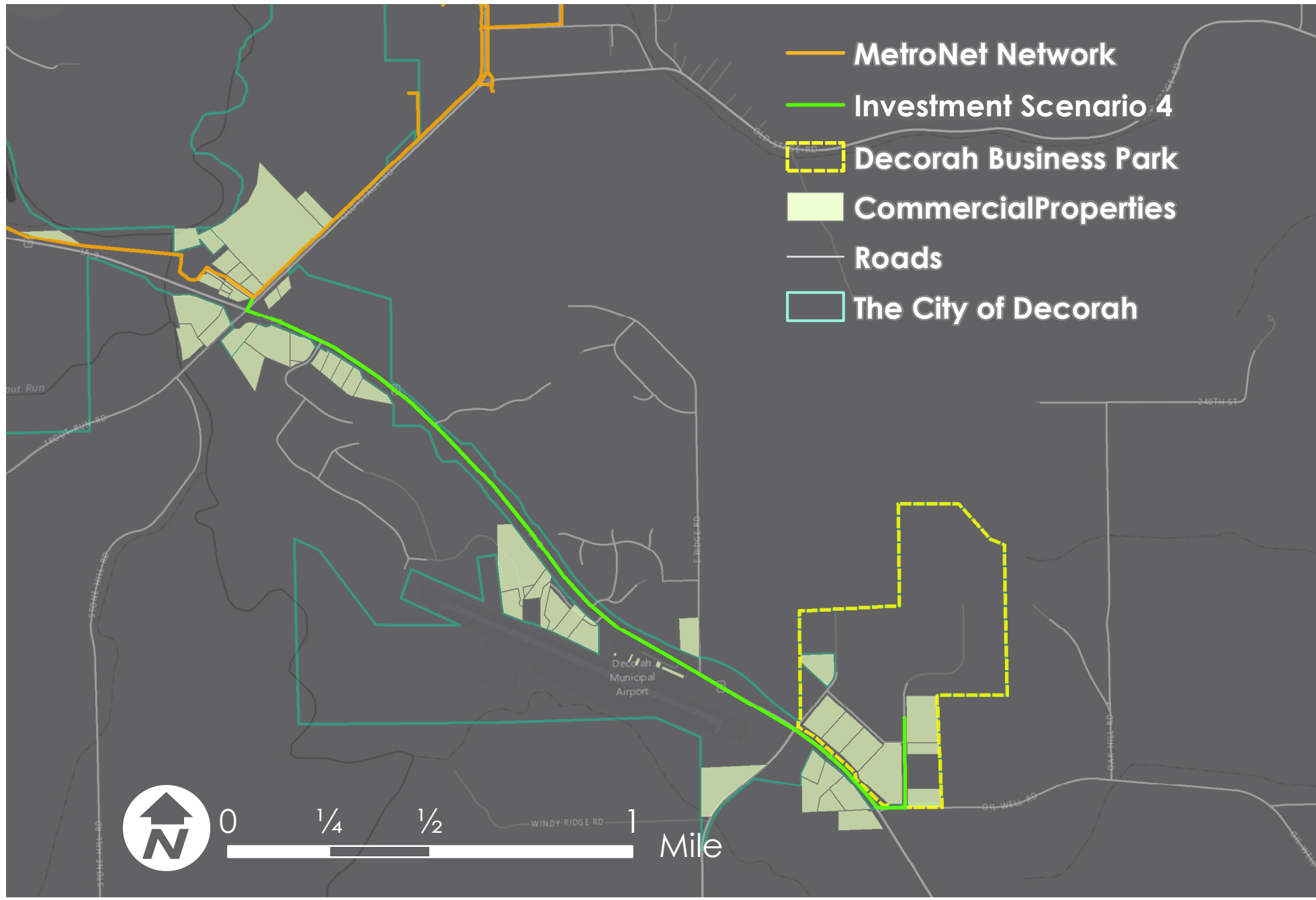
Table 5.6: Potential Grant Opportunities - Scenario 3

IRU Rate		Number of Strands to Meet IRU Income	
IRU Income (mile/month/strand)	Mile	Target	
\$ 40,875	\$ 125	1	27

Table 5.7: Break-even IRU - Scenario 3

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Decorah Business Park - SCENARIO 4



Map 5.4: The business park expansion scenario is the shortest build-out

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## 5.4 Scenario 4 – Decorah Business Park

Scenario 4 focuses on targeting businesses in the City of Decorah Business Park. Similar to Scenario 3, the primary purpose of extending services to the business park would be to stimulate economic development. Offering service to the business park could increase the efficiency of current businesses and attract new business. The business park serves as a prime location for new or expanding industries.

The build-out is the shortest of all scenarios, at 2.35 miles. Road right-of-ways are used along highway 9 to complete the scenario. Scenario 2 has the addition of three associate members, but otherwise remains the same as Scenario 2.

The cash outflow and inflow for Scenario 4 can be found in Table 5.8. The total construction cost is low due to the relatively short amount of fiber needed. Scenario 4 and Scenario 3 share a number of the same grants due to the similar purpose of the scenarios (Table 5.9). This presents an issue moving forward because grants can only be applied to only one scenario.

The required IRU income to cover O&M of the new network would be relatively low. The \$83,179 gap can be covered by contracting out 17 strands of fiber that cover at least 25% of the total network mileage (Table 5.10).

The social benefits of Scenario 4 are increased communication access for businesses to online markets. The business survey indicated that most of the businesses have access to the internet, but only 30% of businesses are satisfied with their current capacity and speed. Businesses also indicated needing more internet capacity and speed in the next five years. Scenario 4 grants businesses access to increased broadband services, which could lead to business retention and expansion. The addition of broadband infrastructure as a business location factor is another social benefit. The business interviews indicated that internet is essential for business communications, projects, and online sales. The presence of broadband in the business park may increase attraction, retention, and the likelihood of filling current vacancies.

Scenario 4 Financial Analysis			
FISCAL YEAR	Construction Period		Operation
	FY16-18		Period
Capital Outflow	Total		FY19-FY28
Expansion Cost	\$343,745		N/A
	Total	Annual	Annual
Operation and Maintenance	\$296,700	\$98,900	\$ 125,583
Internet Service Payment	\$30,000	\$10,000	\$ 10,000
Cash Reserved	\$59,340	\$19,780	\$ 25,117
<b>Total Outflow</b>	<b>\$729,785</b>		<b>\$ 160,700</b>
Capital Inflow	Grant	No Grant	Annual
Grant	\$343,745	\$0	N/A
<b>Board Members Payment</b>	<b>\$135,000</b>	<b>\$135,000</b>	<b>\$ 45,511</b>
Each Anchor Member Fee	\$ 7,500	\$ 7,500	\$ 9,102
<b>Associate Members Payment</b>	<b>\$209,682</b>	<b>\$553,427</b>	<b>\$ 18,205</b>
Each Associate Member Fee	\$ 23,298	\$ 61,492	\$ 4,551
<b>Current IRU Income</b>	<b>\$ 41,358</b>	<b>\$ 41,358</b>	<b>\$ 13,786</b>
<b>Estimated New IRU Income</b>	<b>N/A</b>	<b>N/A</b>	<b>\$ 83,197</b>
<b>Total Inflow</b>	<b>\$729,785</b>		<b>\$ 160,699</b>
<b>Net Capital Flow (Cash Reserved)</b>	<b>\$0</b>		<b>\$0</b>

Table 5.8: Financial Analysis - Scenario 4

Potential Grant Opportunities - Scenario 4		
Program	Agency	Funds Available
Rural Business Enterprise Grant Program	USDA	\$ 500,000
Rural Business Opportunity Grant	USDA	\$ 100,000
Rural Community Development Initiative Grant	USDA	\$ 250,000
Rural Cooperative Development Grant	USDA	\$ 200,000
Rural Business Development Grant	USDA	\$ 500,000

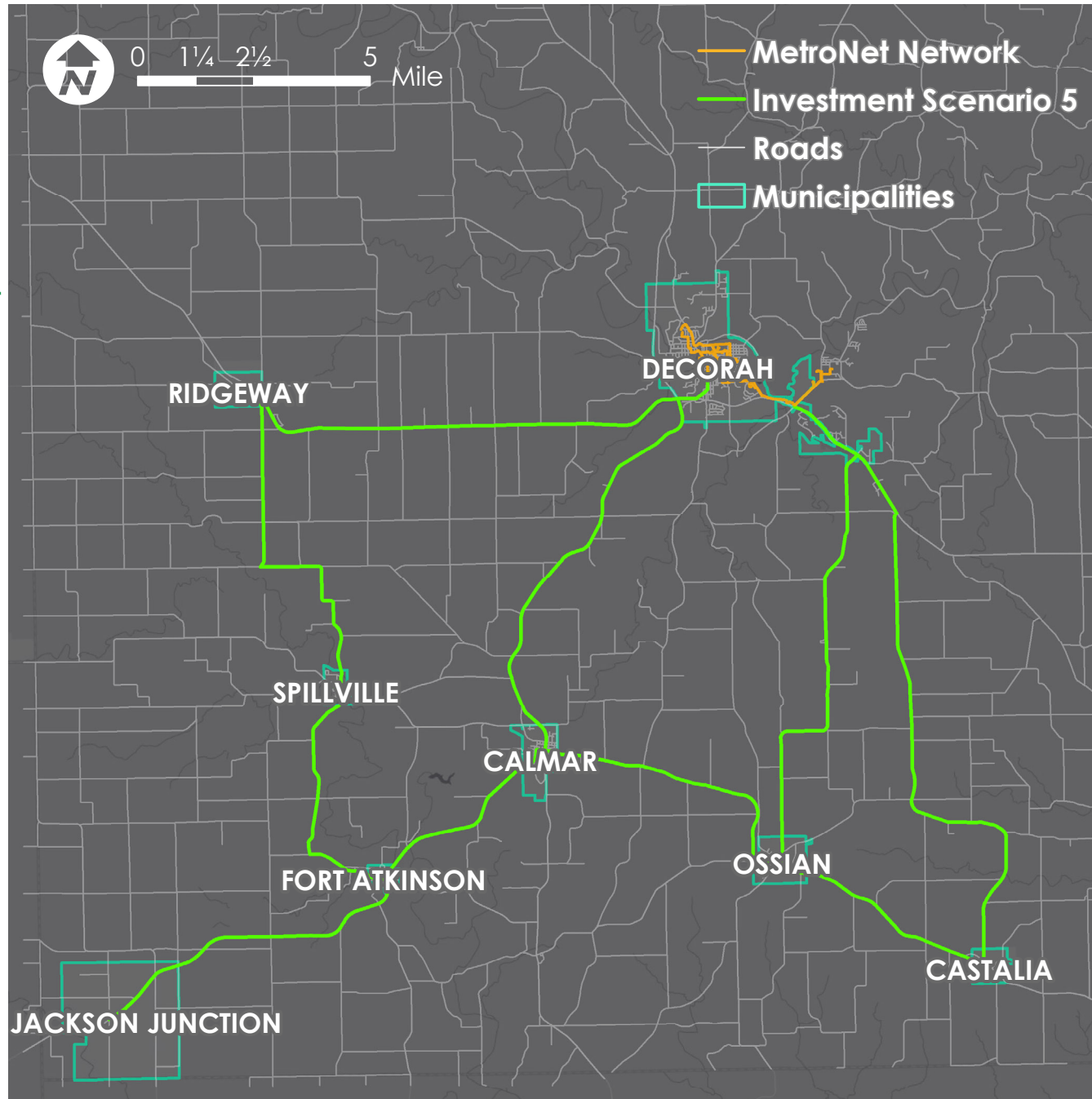
Table 5.9: Potential Grant Opportunities - Scenario 4

IRU Rate		Number of Strands to Meet IRU Income	
IRU Income (mile/month/strand)	Mile	Mile	Target
\$ 83,198	\$ 125	3.34	17

Table 5.10: Break-even IRU - Scenario 4



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Map 5.5: The final scenario is a county build-out to the listed municipalities



## 5.5 Scenario 5 – Greater Winneshiek County

One key focus for the DMN is to meet the needs of Winneshiek County. The DMN aims to work with other public entities to expand the network in a county-wide loop. The target user group for Scenario 5 would be municipal governments in the county. The expansion would consist of running fiber to the City of Calmar, City of Ridgeway, City of Ossian, City of Castalia, City of Fort Atkinson, City of Spillville, and connecting them to the City of Decorah.

The build-out consists of 10 routes that would use road right-of-ways to reach each municipality. The cost and mileage for each stretch of Scenario 5 is broken down to illustrate the variations in the scenario (Table 5.11). The full scenario build-out cost and cash inflow potential is presented in Table 5.12. Routes could be completed one at a time, in phases, or in conjunction with one another.

All construction costs could be covered by potential grants in a best case scenario. If no grants are attained the cost of construction would be too high for any new, or current, DMN board members. The scenario is only feasible with significant grant funds acquired. Scenario 5 is the only scenario in which the \$15,000 anchor contribution cap applies, due to the large increase in operations and maintenance costs.

The \$929,521 gap in funding between the member contributions and the cost to maintain the network could be covered by 26 strands contracted at 25% of the total network miles.

Social benefits include the increase of service capability of the municipalities, coupled with potential extension of the network for residential and business access. Similar to Scenario 1, increased accessibility for municipalities would lead to increased efficiency, which indirectly benefits residents and businesses. The expansion of the backbone network could spur development of utilities, cooperatives, and organizations to offer internet service to underserved and rural areas.

Expansion Cost of Each Line in Scenario 5		
Line	Mile	Cost
Decorah to Castalia	15	\$1,909,677
Decorah to Ossian	12	\$1,524,056
Ridgeway to Spillville	8	\$1,084,265
Fort atkinson to Spillville	6	\$758,892
Decorah to Ridgeway	10	\$1,316,681
Fort Atkinson to Jackson Junction	7	\$960,167
Calmar to for Atkinson	5	\$582,191
Calmar to Ossian	7	\$840,995
Ossian to Castalia	5	\$654,935
Decorah to Calmar	11	\$1,372,175
<b>Total</b>	<b>85</b>	<b>\$11,004,034</b>

Table 5.11: Expansion Cost of Each Line in Scenario 5

<b>Scenario 5 Financial Analysis</b>			
<b>Fiscal Year</b>	<b>Construction Period</b>		<b>Operation Period</b>
<b>Capital Outflow</b>	<b>FY16-18</b>		<b>FY19-FY28</b>
	<b>Total</b>		<b>Annual</b>
<b>Expansion Cost</b>	<b>\$11,004,034</b>		<b>N/A</b>
	<b>Total</b>	<b>Annual</b>	<b>Annual</b>
<b>Operation and Maintenance</b>	<b>\$ 296,700</b>	<b>\$ 98,900</b>	<b>\$ 959,006</b>
<b>Internet Service Payment</b>	<b>\$ 30,000</b>	<b>\$ 10,000</b>	<b>\$ 10,000</b>
<b>Cash Reserved</b>	<b>\$ 59,340</b>	<b>\$ 19,780</b>	<b>\$ 191,801</b>
<b>Total Outflow</b>	<b>\$11,390,074</b>		<b>\$ 1,160,807</b>
<b>Capital Inflow</b>	<b>Grant</b>	<b>No Grant</b>	
<b>Grant</b>	<b>\$ 11,004,034</b>	<b>\$0</b>	
<b>Board Members Payment</b>	<b>\$ 181,596</b>	<b>\$ 2,626,937</b>	<b>\$ 105,000</b>
Annual Each Current Anchor Member Fee	\$ 7,500	\$ 7,500	\$ 15,000
Annual Each New Anchor Member Fee	\$ 7,766	\$ 415,323	\$ 15,000
<b>Associate Members Payment</b>	<b>\$ 163,086</b>	<b>\$ 8,721,779</b>	<b>\$ 112,500</b>
Each associate member Payment	\$ 3,883	\$ 207,661	\$ 7,500
<b>Current IRU Income</b>	<b>\$ 41,358</b>	<b>\$ 41,358</b>	<b>\$ 13,786</b>
<b>Estimated New IRU Income</b>	<b>N/A</b>	<b>N/A</b>	<b>\$ 929,521</b>
<b>Total Inflow</b>	<b>\$11,390,074</b>		<b>\$ 1,160,807</b>
<b>Net Capital Flow</b>	<b>\$0</b>		<b>\$0</b>

Table 5.12: Financial Analysis - Scenario 5

<b>Scenario 5 - Number of Participants</b>		
	Construction	Operation
Current Anchor	6	5
New Anchor	2	2
Associate	14	15
Current IRU	2	2
New IRU	0	4

Table 5.13: Number of Participants - Scenario 5

<b>Potential Grant Opportunities - Scenario 5</b>		
<b>Program</b>	<b>Agency</b>	<b>Funds Available</b>
Rural Business Enterprise Grant Program	USDA	\$ 500,000
Rural Business Opportunity Grant	USDA	\$ 100,000
Rural Community Development Initiative Grant	USDA	\$ 250,000
Rural Cooperative Development Grant	USDA	\$ 200,000
Rural Business Development Grant	USDA	\$ 500,000
Community Connect Grant	USDA	\$ 3,000,000
Connecting Iowa farms, schools, and communities	Iowa Gov	\$ 1,650,605
Tech Hire Partnership Grant	DOL	\$ 5,000,000

Table 5.14: Potential Grant Opportunities - Scenario 5

<b>IRU Rate</b>		<b>Number of Strands to Meet IRU Income</b>	
<b>IRU Income</b>	<b>(mile/month/strand)</b>	<b>Miles</b>	<b>Target</b>
\$ 929,521	\$ 125	24	26

Table 5.15: Break-even IRU - Scenario 5



# Chapter Six

## RECOMMENDATIONS

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6.1 Organizational Evaluation

6.2 Investment Scenario Evaluation

6.3 Final Recommendations



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## Overview

The criteria for evaluation assess two key components of the project; the organizational structure and the investment scenarios. The criteria help determine the feasibility of future expansion plans and organizational framework. The evaluation of organizational models identifies the opportunities and threats of adapting the 28E organization to accommodate a tiered structure and an open access policy. Based on the evaluation, our recommendations include the adaptation of the current 28E structure to take advantage of the potential opportunities and avoid the identified threats.

The evaluation of investment scenarios analyzed six key factors based on Decorah MetroNet (DMN) objectives, community goals, and cost effectiveness. For each key factor, investment scenarios were ranked according to their performance for that specific variable. The recommendation for a best fit scenario was determined according to which investment scenario remained financially feasible and achieved the highest overall rank for the key factors.

## 6.1 Organizational Evaluation

The DMN board indicated that they wish to remain a 28E partnership, as opposed to other organization types. However, the following evaluation could be applied to a range of organization types. Secondary research and interviews with experts in the field were used to identify opportunities and threats to develop recommendations for future organizational changes. Opportunities are identified as beneficial uses and assets that can be leveraged to help the DMN achieve its goals. Threats are those disadvantages of an organizational structure that present barriers or difficulties for the DMN's future growth.

### The Tiered 28E Partnership

Based on the research from Chapter 4, adapting the 28E structure to accommodate a tiered membership structure would capitalize on the flexibility of a 28E to promote new members into the partnership. The following list of opportunities and threats assesses the potential positive and negative attributes that need to be taken into consideration by the DMN board.

## 28E Tiered Membership

### Opportunities

- Flexibility to adopt a tiered membership
- Promotes the inclusion of more organizations that support broadband development
- Establishes greater access for financially limited organizations
- DMN board maintains locus of control
- Grants are widely available due to public purpose doctrine of the 28E agreement
- External access to network through IRU contracts generates additional revenue

### Threats

- Reduction in member contributions could occur if anchors downgrade to associate status.
- Dilution of control for current board members as new members enter the partnership
- Only governmental & quasi-governmental organizations can enter into the 28E partnership
- 28E partnerships cannot obtain direct loans



### Summary of Tiered 28E Membership for the DMN

The establishment of a tiered 28E structure incorporates an associate member status, in addition to the current anchor member status. The addition of the associate member tier promotes partnership with smaller, potentially financially limited entities. Incorporating new members in to the partnership assists in distributing costs associated with network expansion. Associate members pay 50% of the fees assessed to anchor members, and have access to a single strand of fiber, as opposed to the two received by anchor members. Associate members receive a ½ vote in DMN board decisions, while anchors receive one full vote.

Financially, new members (anchor and associate) pay a three year construction period rate, to mitigate previous investment cost of existing members. After the three year period, all members pay equal amounts annually. During both these payment terms, associate members always pay 50% of the rate for anchor members.

## Open Access Model

An open access framework establishes a non-discriminatory policy for access to the network. The following list identifies opportunities and threats related to the DMN instituting an open access policy.

### Summary of an Open Access Model for the DMN

Before opening up the network to new contract holders, the DMN board must determine the following attributes regarding their IRU contracts; number of total strands or strand miles it is willing to devote to IRU contract use, a standard rate, a cap for the amount of dark fiber one IRU contract can obtain, and procedures for application. The establishment of a of these standardizations must then be applied equally to all parties pursuant of an IRU contract. The network is open and non-discriminatory until the capacity of fiber dedicated for IRUs is filled.

Adopting an open access policy helps limit the potential for future litigation from incumbent service providers. Additionally, it promotes access through transparent and non-discriminatory terms to generate more funds through new IRU contracts.

## Open Access Policy

### Opportunities

- Minimizes potential litigation through non-discriminatory practices
- Promotes equal access to providers & users
- Establishes equal and non-discriminatory access for internet service providers
- Standardizes IRU pricing for dark fiber
- Minimizes administrative needs through standardized procedures
- DMN can set a cap on the number of strand / miles per IRU
- DMN is only responsible for system access, not internet service

### Threats

- Competition from incumbents
- All providers, including a utility and private providers, have equal access to the network.
- A municipal utility, cooperative, non-profit would not be able to become a member of the 28E



## 6.2 Investment Scenario Evaluation

The investment scenario evaluation involves the financial feasibility of each scenario and their ranking under each criteria. The six criteria were created based on the DMN goals, community goals, and level of cost effectiveness. All scenarios were analyzed based on the following criteria:

- Total cost of construction
- Number of residents reached
- Number of businesses reached
- Number of potential community partners
- Cost per new user
- Amount of potential funding

### Criteria Descriptions

**The total cost of construction** is a difficult barrier for the 28E, since financing is limited to member contributions, grants, and IRU revenues. The upfront capital required may delay construction or make a scenario unfeasible. The scenarios are ranked lowest to highest upfront cost to construct.

**The total number of residents, businesses, and community partners** reached directly relates to the DMN and community goals. The chief concern is meeting the needs of current and future users in the county.

**The cost per new user** reduces the feeling of “sticker shock” when looking at the total costs of the network construction. Sticker shock refers to the feeling buyers have when looking at the high price of a product or service. In this case, the cost per new user amount helps identify the non-monetary benefits for each scenario in comparison to the cost to construct. Each user type in this scenario is weighted equally. Each scenario is ranked largest to smallest cost.

**The total amount of available grant funds** may make some scenarios more feasible than others. One limitation of this criteria is the volatile nature of grants. One year may see an increase or decrease in grants based on federal and state finances. Some scenarios may become more feasible as grant opportunities become available.

### Regarding Scenario 1

Scenario 1 consists of changes only to the organizational structure of the DMN. Since there is no investment in the physical network, Scenario 1 is not considered in the following evaluation or any of the recommendations. The DMN has provided feedback that they wish to expand their network in some way, thus a “no change” scenario is not a feasible recommendation.

## Criteria for Evaluation Rankings



### Cost of construction (Lowest to Highest)

1. Scenario 4 (\$343,745)
2. Scenario 3 (\$901,004)
3. Scenario 2 (\$5,471,974)
4. Scenario 5 (\$11,004,034)



### Number of residents reached

1. Scenario 2 (2568 residential parcels)
2. Scenario 5 (+Indirectly\*)
3. Scenario 3 (N/A)
4. Scenario 4 (N/A)



### Number of businesses reached

1. Scenario 3 (120 commercial parcels)
2. Scenario 4 (10 business parcels)
3. Scenario 5 (+Indirectly\*)
4. Scenario 2 (N/A)



### Number of potential community partners

1. Scenario 3 (16 organizations)
2. Scenario 5 (14 organizations)
3. Scenario 4 (4 organizations)
4. Scenario 2 (N/A)



### Cost per new user (Lowest to Highest)

1. Scenario 2: \$2,125 to meet the needs of 1 user
2. Scenario 3: \$6,390 to meet the needs of 1 user
3. Scenario 4: \$18,091 to meet the needs of 1 user
4. Scenario 5: \$550,201 to meet the needs of 1 user\*



### Amount of potential funding (Highest to Lowest)

1. Scenario 5 (\$11,200,605)
2. Scenario 2 (\$1,670,796)
3. Scenario 3 (\$1,550,000)
4. Scenario 4 (\$1,550,000)

Scenario 2 

Scenario 2 benefits from the number of residential parcels within the City of Decorah. Due to the high number of parcels, the scenario ranks first in the number of residential parcels reached and the lowest cost per new user.

Unfortunately, Scenario 2 is financially unfeasible. There are not enough total grant funds to cover the cost of construction. The financing of Scenario 2 would be difficult for the DMN to manage, unless an outside organization were able to bond or take out a loan on construction.

Scenario 3 

Scenario 3 presents the best overall ranking. Scenario 3 is ranked first in the number of community partners and businesses it could reach. The scenario is also ranked highly in all other categories, except the total number of residents reached. Scenario 3 meets most of the community goals and DMN financial capabilities.






Scenario 4 

Scenario 4 is the shortest of all build-out scenarios, and the least expensive expansion. The scenario could qualify for the same amount and types of grants as Scenario 3 but does not meet as many users.

Scenario 5 

Scenario 5 is consistently ranked below the other scenarios. It is the most costly build, but unlike Scenario 2, its available grants could cover all initial construction costs. Based on the criteria for evaluation, Scenario 5 would not be advisable when compared to the other scenarios.

**\*Scenario 5** contains indirect benefits associated with the increased spatial reach of the network. The indirect benefits relate to the opportunity for other municipal or internet service organizations to invest into fiber-optic broadband. As Scenario 5 builds-out into the county, it may become easier for new organizations to meet the needs of residential, business, and community partners along the network. If the number of potential indirect users were counted for Scenario 5, it would drastically change the cost to meet one user and the total amount of users reached. The results would present Scenario 5 as the best fit scenario.

-  = Ranked 1<sup>st</sup> in Criteria
-  = Ranked 2<sup>nd</sup> in Criteria
-  = Ranked 3<sup>rd</sup> or 4<sup>th</sup> in Criteria
-  = Not Applicable in Scenario
-  = Potential indirect benefits\*

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## 6.3 Final Recommendations

### Final Financial Recommendations

The investment scenario financial analysis framework utilized two main assumptions that should be integrated into DMN documentation and financial practice; market rate IRUs and a cash reserve policy.

The current DMN IRU rate is lower than the market rate, based on a market analysis of seven similar broadband networks. A more appropriate market rate is \$125 per strand per mile per month. This rate is reflected in several networks, such as DeKalb County, Illinois. Adjusting future IRUs to the market rate will increase the amount of cash inflow and may allow DMN partners to reduce their yearly contributions.

The establishment of a cash reserve policy is a common practice for organizations with large infrastructure investment. A cash reserve allows for an organization to absorb unforeseen costs. Currently, the DMN does not have a policy or cash reserve fund for such occasions. Based on case studies, we recommend setting a minimum cash reserve at 20% of operation and maintenance costs. A maximum cash reserve can be determined by the board, but is not essential. Establishing a cash reserve is crucial to safeguard the partners in the case of unexpected damages or events.

### Final Investment Scenario Recommendations

The investment scenario that achieved the most DMN and community goals, as well as cost effectiveness is Scenario 3: Downtown Decora Businesses. Scenario 3 is the best fit for reaching businesses and potential community partners. It ranked second in all other criteria except total residents reached. Scenario 4, although the least expensive, meets the least number of users. Due to the large difference between funding opportunities and total cost, Scenario 2 is unfeasible.

Scenario 5 is the most expensive due to the length of fiber needed, but presents the best opportunity for grants. When taking indirect benefits into account, it becomes the best scenario for meeting the needs of the entire county, and presents excellent opportunities for the county infrastructure.

## Organizational Recommendations

The analysis of opportunities and threats informed the following final organizational recommendations; incorporate a tiered membership structure and adopt an open access policy.

### Amending Government Documentation

The current DMN 28E agreement requires amendment to incorporate a new organizational structure and an open access policy.

- DMN 28E – All sections: Incorporate “Associate member” into documentation. Amend to incorporate board voting, where anchors member retain 1 full vote each, and Associate members have a 1/2 vote each
- DMN 28E – Section 7, “Purpose”: Amend to include goals of extending service for underserved and rural regions, municipalities, intergovernmental communications, and disaster data recovery.
- DMN 28E – Section 9, “Financing”: Amend to incorporate cash reserve policy and new financial structures identified in chapter 5.
- DMN 28E – Section 10, “Ownership”: Amend to include Associate member’s single strand policy. Amend ownership to incorporate equal, undivided interest by all 28E members to reduce redundant amendments in the future
- DMN 28E – Section 11, “Withdrawal”: Amend to include member status changes (I.e. Anchor to Associate Member).
- DMN 28E – Section 14, “Additional Anchor Members”: Amend to incorporate new associate members.
- DMN 28E – Section 15, “Equal Treatment”: Amend to adopt an open access policy and non-discriminatory pricing system.

### Amending Government Documentation

Government documents at the local and regional level should adopt language promoting the integration and advocacy of increased internet connectivity throughout the county. These documents include the City of Decorah Comprehensive Plan, Winneshiek County Comprehensive Plan, zoning ordinances, and subdivision regulations. While these documents currently include minor mentions of telecommunications infrastructure or services, it is beneficial to bolster the language, reflecting the community support and demand for higher quality internet service. It is advantageous to include broadband development language into government and planning documents to reduce the number of barriers to physical development and prioritize broadband development in future city and county planned developments.



# Chapter Seven

## IMPLEMENTATION

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### 7.1 Implementation Plan

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## 7.1 Implementation Plan

The implementation plan was developed to assist the Decorah MetroNet (DMN) board and the community in the expansion of the existing network and development of future broadband access. The goals for the DMN and the community presented in Chapter 3.4 are the focus of the implementation and presented at the top of each implementation chart in bold. Under each goal there are a number of action items with correlating summaries, estimated duration, suggested responsible participants, and performance measures.

The action items are categorized as “High”, “Medium”, and “Low” to help prioritize the steps of implementation. The items ranked “High” are either time sensitive or are necessary to accomplish other steps in the implementation plan. The “Medium” level items are important, but require other items to be accomplished first. Finally, the “Low” priority items are helpful for future development, but are not essential in accomplishing implementation steps.

## Implementation Plan - Decorah Metronet Goal 1 (Continued on next page)

### 1. Expand to include more community partners

Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
High	Amend current 28E	As the partnership chooses to expand, the 28E will require a number of amendments. A full list of recommendations can be found in Chapter 6.3 that should be considered.	0 - 2 years	DMN Board & County Attorney, or other designated legal counsel	Amendments for the 28E should be applied within the next two years.
	Review and determine appropriate rate for new members	Recommendations in Chapter 6.3 indicate a number of membership costs for both levels of members that	0 - 2 years	DMN Board	A membership system has been determined before the addition of new members.
	Establish cash reserve policy	A cash reserve policy would enable DMN to save capital for future investment and ensure money is available in cases of emergency. A cash reserve policy is also common among other fiber-optic broadband networks.	0 - 2 years	DMN Board	Has a cash reserve policy been amended into the 28E? A cash reserve should be established by the next fiscal year.
	Develop expansion strategy	The recommendations in Chapter 6.3 offer a number of expansion options for the DMN to pursue	2 - 5 years	DMN, Winneshiek County, & City of Decorah	Has the first phase of expansion been identified?
	Develop new IRU documentation and rate	The current IRU rate is under the market rate. Recommendations in Chapter 6.3 offers a more appropriate rate for IRUs.	0 - 2 years	DMN Board	The market rate for IRUs should be applied to all new IRU contracts.
	Consult legal counsel	Legal counsel is essential when discussing future changes to the 28E documentation and IRU contracts.	0 - 1 year	DMN	Has a connection with legal counsel been developed?

Table 7.1: Decorah MetroNet (DMN) high priority items for goal 1



## Implementation Plan - Decorah Metronet Goal 1

1. Expand to include more community partners					
Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
Medium	Create and hire an administrative position to manage expansion and implementation goals	As the network continues to expand, DMN will require more administrative activities that may not be feasible for the board members to complete. An administrative position would oversee IRU contracts, network build-out, implementation goals, and answer to the DMN board.	2 - 5 years	DMN	A position description and salary is decided for one position.
	Identify and reach out to potential IRU contracts	Identifying and contacting potential IRU contract holders could indicate the interest in future IRUs.	1 - 3 years	DMN	At least 4 potential IRU holders have been identified and contacted to gauge interest.
	Identify and reach out to potential anchor and associate members	Identifying and contacting potential members to DMN could help determine which investment scenario to pursue and what future membership contribution would amount to.	1 - 3 years	DMN	Has a list of potential members been created? Have at least 30% of the identified potential members been contacted each year until the list is exhausted?
Low	Establish working relationship with Mabel Telecom	Mabel Telecom has extended into northwest Winneshiek County to offer network connection and service. Connecting with this group could help DMN navigate further network development	0 - 1 year	DMN	Mabel Telecom has been contacted in the past year and a meeting has been set for the next 6 months.

Table 7.2: DMN medium and low priority items for goal 1

## Implementation Plan - Decorah MetroNet Goal 2

### 2. Collaborate with other organizations to promote economic development

Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
High	Create a grant writing team to apply for funding	Grant fund is essential to cover initial network construction costs. An interdisciplinary team should be assembled to apply for the maximum amount of funding available per scenario.	0 - 1 year	DMN, City of Decorah, Winneshiek County, and other interested community agencies	A team of professionals from economic development, education, healthcare, and community development sectors should be convened in the next 6 months. A list of 5 prioritized grants should be identified and pursued.
Medium	Establish a connection with the Decorah Area Chamber and Winneshiek County Development Inc.	Establishing a connection with the area economic development organizations (EDO) could help inform the board of economic development opportunities and inform the EDOs of DMN plans.	0 - 1 year	DMN, Decorah Area Chamber, & Winneshiek County Development, Inc.	Has the DMN Board and EDOs established positions on each others' board or other type of connection?

Table 7.3: DMN action items for goal 2

## Implementation Plan - Decorah Metronet Goal 3

### 3. Inform and educate the public of the DMN's purpose and goals

Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
Medium	Create and host annual or biannual meetings to educate public and interested parties	Hosting a annual or biannual meeting during off-work hours could increase the amount of community participation and educate the public on the current happenings of DMN. The meetings would be overview of activities in the past 6 months/year and future activities	0 - 1 years	DMN	Plan and implement an initial informational meeting open to the public in the next 3 months.
Low	Develop materials on the benefits and advantages of the DMN	Develop materials to use when advertising and contacting potential IRU contract holders and members.	2 - 3 years	DMN	Develop materials describing the purpose, mission, and goals of the DMN in 6 months. Develop additional materials related to benefits of becoming a member or IRU holder in 2 years; after documentation amendments.
	Update and maintain DMN website	The DMN current hosts a website with little information for public education and interested future partners. The update and frequent maintenance is needed to educate and inform the public.	1 - 2 years	DMN	After the purpose, mission, and goals are clarified, the DMN website home page is updated with the information and meeting times. This should be accomplished in the next year. Set an update schedule for every month to keep the website up-to-date.

Table 7.4: DMN implementation items for DMN goal 3

## Implementation Plan - Community Goal 1

### 1. Expand broadband network to include more residents, existing businesses, and municipal governments

Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
High	Develop city utility or cooperative to support Scenario 2 development	Scenario 2 requires a significant amount of upfront capital which cannot be met by the number of available grants. A utility, cooperative, or other type of organization could be created to bond or take out a loan for construction.	2 - 5 years	City of Decorah	A feasibility study and proposal for a city utility or cooperative should be initiated and completed in the next 2 years.
	Develop a City & County Broadband Working Group	A county-wide working group should be assembled to address community implementation goals and work with the DMN and other organization to development a broadband network	0-1 years	Winneshiek County and City of Decorah Add other muni's	A working group should be assembled in the next 6 months to address goals and action items in this document.
Medium	Develop and integrate broadband policies into planning documents	Integrating broadband practices into planning documents can improve efficiency and effectiveness of broadband expansion and adoption. Chapter 6.3 offers a number of documents and recommendations for document integration.	3 - 5 years	Winneshiek County and/or City of Decorah	A schedule for document updates should be drafted by a county and city sponsored group in the next year. Each year at least 1 planning document should be updated with broadband development friendly language and goals.
	Develop a strategy to reach underserved rural residents	The spatial reach of these residents can be an issue when deciding where to deploy broadband first. A strategy to meet these residents in a timely manner should be developed and implemented with available resources.	5 - 10 years	Winneshiek County	Geographical areas within Winneshiek County should be identified and an expansion schedule developed in the next 5 years.
	Reassess residential internet service environment	The residential survey indicated that a number of residents were dissatisfied with the level of residential internet service and cost of internet. Re-evaluating the residential internet service in 5 year would allow DMN and partner agencies to observe if the residents are receiving the service they need.	5 years	DMN, City of Decorah, Winneshiek County	An amended version of the business survey should be deployed in 5 years to measure the change in internet services. (Can be found in deliverables packet)

Table 7.5: Community action items for goal 1

## Implementation Plan - Community Goal 2

### 2. Find consistent funding sources to sustain and maintain the network

Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
High	Create a grant writing team to apply for grant funding	Grant fund is essential to cover initial network construction costs. An interdisciplinary team should be assembled to apply for the maximum amount of funding available per scenario.	0 - 1 year	DMN, City of Decorah, Winneshiek County, and other interested community agencies	A team of professionals from economic development, education, healthcare, and community development sectors should be convened in the next 6 months. A list of 5 prioritized grants should be identified and pursued.
Low	Develop financial assistance programs for businesses	Business connection to broadband internet could increase efficiency and online sales. Some businesses may not have the needed capital to invest in fiber to the premise. A financial assistance program may assist with broadband connection and adoption for businesses	3 - 5 years	City of Decorah, Winneshiek County, and local banks and lenders	In the next 3 years, a financial assistance program should be developed to help business afford fiber to the premise and technology upgrades.
	Develop and provide programs to low-income residents to gain internet connection	Broadband connection has the ability to increase the level of access residents have to information. Low-income residents may not be able to current afford fiber to the premise construction. A financial assistance program may assist with broadband adoption in low-income areas.	3 - 5 years	City of Decorah, Winneshiek County, and local banks and lenders	In the next 3 years, a financial assistance program should be developed to help low-income households afford fiber to the premise and technology upgrades.

Table 7.6: Community action items for goal 2

## Implementation Plan - Community Goal 3 (Continued on next page)

### 3. Connect and grow technology based businesses

Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
High	Integrate internet related questions into business site visits	Site visits allow for economic development professionals to collect information on current business environment factors, including internet usage and future needs. The provided questions can collect data to measure the impact of broadband development. (Appendix 11)	0 - 1 years	DMN, Decorah Area Chamber of Commerce, Winneshiek County Development, Inc., & Upper Explorerland Regional Planning Commission	The provided questions should be integrated into business site visits in the next 3 months. At least 10% of Winneshiek County's businesses should be surveyed each year.
	Integrate internet related questions into business entry interviews	Entry interviews/surveys allow the area to identify and measure the important business factors that attract businesses. Integrating broadband related questions into the entry tools would measure the impact of broadband on business location. (Appendix 11)	0 - 1 years	DMN, Decorah Area Chamber of Commerce, Winneshiek County Development, Inc., & Upper Explorerland Regional Planning Commission	The provided questions should be integrated into business site visits in the next 3 months. All entering business should be interviewed or surveyed.
	Integrate internet related questions into business exit interviews	Exit interviews/surveys allow for regional agencies to identify and measure the factors that have led to businesses leaving the area. Integrating broadband related questions into the exit tools would measure the influence of broadband on businesses decision to leave the area. (Appendix 11)	0 - 1 years	DMN, Decorah Area Chamber of Commerce, Winneshiek County Development, Inc., & Upper Explorerland Regional Planning Commission	The provided questions should be integrated into business site visits in the next 3 months. All exiting business should be interviewed or surveyed.

Table 7.7: Community high priority action items for goal 3

## Implementation Plan - Community Goal 3

3. Connect and grow technology based businesses					
Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
Medium	Reassess business internet service environment	The business survey and interviews indicated that many businesses will need more capacity and higher speeds in the next five years. Re-evaluating the business environment in 5 year would allow DMN and partner agencies to observe if the businesses are receiving the service they need.	5 years	DMN, City of Decorah, Winneshiek County, Upper Explorerland Regional Planning Commission, & Winneshiek County Development, Inc.	An amended version of the business survey should be deployed in 5 years to measure the change in internet services. (Can be found in deliverables packet)
Low	Develop and actively promote technology advantages of Winneshiek County	Marketing is an essential part to attracting new technology based businesses. Once fiber-optic broadband is available to businesses and business sites advertisement is the next step to attracting tech-based businesses	5 - 8 years	Winneshiek County Development, Inc. & Upper Explorerland Regional Planning Commission	Develop materials related to the advantage of fiber-optic broadband for businesses after fiber-optic business expansion. Materials should target internal and external businesses.

Table 7.8: Community medium and low priority action items for goal 3

## Implementation Plan - Community Goal 4 (Continued on next page)

4. Improve public understanding of digital skills and broadband benefits					
Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
Medium	Develop digital skills educational materials and courses	Based on a need for digitally adept workforce, developing materials and educational courses through local libraries and educational institutions could help close the digital skills gap.	1 - 5 years	Winneshiek County Libraries, educational institutions and school districts	Digital skills goals and strategies should be developed by a joint working group in the next year. Pilot programs should be developed and deployed in 2 years. Assessments of programs should occur each year after inception.
	Develop digital hubs in Winneshiek County	Develop wireless hubs in the county for residents who may not have home access to affordable, reliable internet service.	2 - 3 years	Winneshiek County Libraries, DMN, Winneshiek County, & City of Decorah	A strategy for reinforcing current library wireless hubs and creating new hubs should be developed by a joint group in the next 2 years.
	Support and invest in current initiatives to promote digital skills	Identifying what the community is doing best and building that out could be the best investment for the community.	5 - 10 years	DMN, Community School Districts, and other organizations with digital skills programs already in place	Have programs been identified? Have strategies to improve programs been implemented?

Table 7.9: Community medium priority action items for goal 4



## Implementation Plan - Community Goal 4

4. Improve public understanding of digital skills and broadband benefits					
Priority	Action Item	Summary	Duration	Suggested Participant(s)	Performance Measure
Low	Draft and adopt telecommuting programs	Drafting telecommuter programs could increase the number of local businesses which adopt telecommuter programs. Based on business interviews, telecommuting could be an option if businesses knew the advantages of telecommuting. A resource for developing telecommuter policies is <i>An Organizational Guide to Telecommuting</i> by the American Society for Training and Development.	2 - 5 years	Winneshiek County Development, Inc. & Upper Explorerland Regional Planning Commission	A draft of telecommuter policies should be drafted for businesses to view as an example in the next 5 years.
	Promote tele-medicine outreach to households and satellite clinics	Tele-medicine offers a number of advantages to rural and urban residents unable to travel for medical purposes. Developing and promoting outreach could improve the health and livelihood of Winneshiek County residents.	5 - 10 years	Winneshiek County Medical Center and other health agencies	Tele-medicine priorities for the area should be developed in the next 3 years by the healthcare community. Pilot programs should be developed in the next 5 years and assessed on a yearly basis.

Table 7.10: Community low priority action items for goal 4



# Appendix

## REFERENCES & APPENDIX

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## Definitions and Key Terms

**28E Agreement** – in reference to Iowa Administrative Code 28E, which allows for government and non-government agencies to join in a partnership to pursue a common goal.

**Anchor Member** – members which pay the full amount of annual fees and receive full network and organizational benefits

**Associate Member** – members which pay half of the annual fees and receive half of the network and organizational benefits

**Backbone Ring** – the infrastructure of the fiber-optic system in a redundant ring to prevent extended loss of service.

**Bandwidth** – information delivery capacity that is communicated in metric bits per second. Can be used to measure available or consumed information capacity. Generally, higher bandwidth is preferable to lower bandwidth.

**Break-even point** – the point at which a business becomes profitable, or revenue can now cover the fixed cost.

**Broadband** – a telecommunications method which transmits multiple signals and data traffic through a cable medium; loosely defined as high-speed internet.

**BTOP** – Broadband Technology Opportunities Program (BTOP), established in 2009 by the American Recovery and Reinvestment Act (ARRA) to improve broadband access and literacy throughout the country. The National Telecommunication and Information Administration (NTIA) is charged with distribution of the funds.

**Capacity** – maximum amount of information that can flow to and from users in a telecommunications network.

**Connectivity** – the expectation of service and the actual reach of service in a geographical area.

**Dark Fiber** – optical fiber infrastructure that is in place but not being used.

**DSL** – Digital Subscriber Line is a type of internet access using telephone lines. The lines transmit information through copper wiring using an analog signal. Analog signals use acoustic waves to transmit data.

**E-Government** – electronic government pertains to the access to information and services online.



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## Definitions and Key Terms

**Fiber-optic or optical fiber** – a technology which uses plastic or glass tubes to transmit data via light waves. Each end of the fiber is attached to a laser that transmit a certain amount of light.

**Financial Risk** – the possibility or certainty of suffering a loss due to the financial structure, financial transactions, and organization risk of defaulting

**Indefensible Right of Use (IRU)** – Indefensible Rights of Use is a long-term lease agreement of a portion of the capacity of a cable.

**Internal Rate of Return (IRR)** – the internal interest rate of an investment project.

**Last mile** – the final leg of connection between a service provider and customer. This is normally the most expensive aspect to telecommunications connection.

**Market Price** – the economic price for which a good or service is offered in the market place.

**Open Access** – a type of network policy in which access to service provision is not restricted

**Organizational Risk** – the possibility or certainty of suffering a loss due to the organizational hierarchy or system of decision making for a given organization

**Rural Electrification Administration (REA)** – The Rural Electrification Administration created in 1936 by Franklin Delano Roosevelt to provide electric connections and services to the rural United States.

**Telecommunications** – exchange of information between two or more entities including the use of technology. Can be used for the express purpose of communications.

**Underserved** – areas or populations with only partial service coverage at least 768 kilobits per second (kbps) and upstream speeds of 200 kbps or no service at a higher speed threshold of 3 Mbps downstream and 1 Mbps upstream, or low adoption rates

## Appendix 1 - Report Methodology (Continued on next page)

### A1.1 Current Financial Status Analysis

The following financial analysis was performed in Chapter 2. Break-even point is the amount of sales an entity must obtain to begin earning a profit.

$$\text{Break - even Point} = \text{Fixed Costs} \times (1 + \text{Discount Rate}) \frac{\text{Fixed Costs}}{\text{Gross Margin}}$$

Within the break-even formula, the gross margin indicates the amount from revenue that could be allocated to cover fixed costs.

It is common in business that benefits and costs arrive at different times, making profitability of investments difficult to compare. The present value (PV) calculation allows us to take costs that have occurred in the past and benefits occurring in the future and convert them into a value today. Internal rate of return (IRR) and net present value (NPV) are discounted cash flow techniques based on present value calculation. They are used for analyzing the profitability of a project.

Net present value is the difference between the PV of cash inflows and the PV of cash outflows. The NPV solves for the present value of cash flows over project's duration, given a specific discount rate. It tells an investor whether the project will achieve a target yield at a given initial investment. When applied to the DMN, we use the interest rate of municipal bonds today, 1.75%, as the discount rate, as well as the minimal acceptable rate of return to calculate NPV of the DMN project. Given the discount rate of 1.75%, if the NPV is more than \$0, it means that the rate of return of DMN is acceptable. However, if the NPV is less than \$0, it means that the rate of return of DMN is lower than its minimal acceptable rate of return.

IRR for an investment is the percentage rate earned on each dollar invested in a business project during the investment period (Baker, 2006). Mathematically, IRR is the rate required to procure the NPV of zero for a series of cash flows (Jansan, 2004). In other words, it is the interest rate that makes the project's costs and revenues add up to zero, effectively balancing the budget. When the NPV equals zero, the rate represents the actual interest rate yielded by the project, which is the IRR.

$$NPV = \sum_{t=0}^T \frac{Ct}{(1+r)^t} - Co$$

$$IRR = R \text{ when } NPV = \sum_{t=0}^T \frac{Ct}{(1+R)^t} - Co = 0$$

Ct = net cash inflow during the period "t"

Co = total initial investment costs

r = discount rate

t = time period of investment project

### A1.2 Residential Access & Demand

The surveys were available throughout Winneshiek County from November 18th, 2015 to March 1st, 2016. Residents accessed the surveys in an online or paper format. Paper surveys were available at Decorah City Hall and public libraries in Decorah, Calmar, Fort Atkinson, Ossian, and Spillville. Surveys were advertised in public venues, local newspapers, radio interviews, and social media. All posted advertisements contained the QR (quick response) code, link, and information regarding the purpose of the survey (Appendix 2). The City of Decorah and areas serviced by municipal water received survey information attached to their monthly water bills (Appendix 3). As survey collection began, there was an over-representation from urban households, identified using location information provided from the respondent. Urban household are any households existing within the municipal limits of cities in Winneshiek County, while rural households are those outside of any municipal boundaries. A randomized post-card advertisement was sent to rural households to boost rural response rates. Post-cards were delivered to 2200 random rural addresses.

A total of 484 survey responses were collected, 398 of which were completed. 232 responses came from within municipalities in Winneshiek County, while 166 came from rural areas. After the survey was closed, we cleaned the data in preparation for statistical analysis. Outliers were

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## Appendix 1 - Report Methodology (Continued - 2)

identified and inconsistencies were corrected. Based on the nearest intersection to the respondent's home, survey responses were categorized as urban, rural, or non-applicable. Non-applicable are those who did not respond to the location question. For key questions, response distributions were reviewed to find biases or skewed data. Confidence intervals were then calculated for key variables and variables with abnormally high standard deviations. The central tendency was analyzed for the entire data set, as well as for the different samples, those being urban, rural, and non-applicable. The variables and relationships between them were investigated using hypothesis testing, test of two means (independent samples), test of proportions, Pearson correlation coefficient, and chi-squared.

### A1.3 Business Access & Demand

The surveys were available from November 18th, 2015 to January 1st, 2016. The survey was distributed electronically through the Decorah Area Chamber of Commerce e-newsletter. The survey was also advertised in local newspapers and social media. A paper copy was also made available at the chamber office in downtown Decorah.

A total of 109 survey responses were collected. After the survey was closed, the data was cleaned in preparation for statistical analysis. Outliers were identified and inconsistencies were corrected. For key questions, response distributions were reviewed to find biases or skewed data. Confidence intervals were then calculated for key variables and variables with abnormally high standard deviation. The central tendency was analyzed for the entire data set. The variables and relationships were examined using hypothesis testing, test of two means (independent samples), test of proportions, Pearson correlation coefficient, and chi-squared.

A number of the survey questions prepared for both the residential and business surveys did not produce the intended type of responses. Both surveys failed to ask if the internet services purchased by the household or business was a bundle deal. The bundling of service could have led to some current price responses being inflated.

The second question on both surveys that led to uncertain responses is the current speed of the internet connection. The capacity and speed of internet service were originally assumed to be similar measurement; this

is incorrect. The upload and download speed should have been asked to decipher the correct speed of current internet services.

The residential survey although reaching a large percentage of the intended population was not representative of the Winneshiek County households. The educational attainment and household income was significantly higher for the survey respondents than 2013 American Community survey data. The non-representative nature of the residential survey indicates self-selection bias.

The business survey had one major flaw. The business survey asked respondents to list the gross sales for 2014 as a business demographic question. The way the question was asked posed a number of issues. First, the question was not formatted for non-profit organizations that do not exist to sell products or services. A question related to business cash inflow from multiple sources like grants and donations would have been more appropriate. Second, the question answer section was a fill-in the blank format, which was considered invasive by business respondents. A questions with categories of income thresholds would have allowed the businesses to choose categories rather than say the exact amount of sales they make. Finally, the question was not answerable by businesses that were founded in the past year. Some businesses did not have any sales in 2014 because they did not exist. A caveat to the question should have asked to forecast or estimate the total amount of sales or income if they had been founded in the past year.

### A1.4 Business Interviews

The interviews were non-random focusing on businesses with forty or more employees. The businesses were identified through the Winneshiek County Development, Inc. and the Chamber of Commerce. A total of 16 businesses were identified. The businesses were contacted through a business directory housed on the Winneshiek County Economic Development website and business directories on their websites. If contact was not made through email, phone calls were made to the general offices to acquire the correct contact.

Interviews were semi-structured, conducted over the phone, with a script of questions to lead interviewees through business location factors, workforce needs, and the role of internet (Appendix 5).

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## Appendix 1 - Report Methodology (Continued - 3)

### A1.5 Community Visioning

Community input was collected from a focus group format session. A contacts list with individuals from four focus areas was used to send out event invitations. The four focus areas were education, healthcare, equity & community development, and economic development. The participants were divided into small groups with various community sectors at each table for the discussion. A group facilitator at each table led the group through questions about the future of Winneshiek County, community resources, and opportunities for growth (Appendix 6). A recorder was assigned in each group to take notes. The notes were collected by the project team at the end of the event. Maps of Winneshiek County were given to the groups to identify where they felt internet service was most lacking. The maps were also collected at the end of the session.

Two members of the project team alternated regulating the time for each question section to keep the session on time. All four members of the project team rotated around the room to ensure groups stayed on track, and to answer questions if they arose that the table could not answer. The session ended with the team thanking the participants and encouraging them to complete the exit survey.

Participants were given an exit survey to collect general feelings about the session and additional anonymous opinions on the visioning topics (Appendix 6). The questions in the survey assessed the level of satisfaction with the style of the visioning session and if the participant was interested in donating their time, experience, or other resources.

### A1.6 Organizational

Secondary research was conducted alongside case study analysis to identify key features and best practices for 28E partnerships in Iowa and open access policy. Broadband networks within Iowa and across the United States were analyzed for how the network assigned power to board members of administration positions, how networks navigated the legal framework of serving residents and businesses with internet, and financed the construction and operation of their network.

Additionally, professionals were contacted in the fields of infrastructure engineering, municipal administration, telecommunications utility management, and state telecommunications law. Each interview elicited

advice on liability, amendments, and locus of control for organizational decisions.

### A1.7 Scenario Development

The initial step of the financial analysis calculates each scenario's capital outflow. The capital outflow consists of expansion costs, internet service fees, operation and maintenance, and recommended cash reserve. The data used in the cash outflow was retrieved from the City of Decorah and the DMN. The cash outflow is separated into two periods: construction and operation. The construction period is a three year build-out of the physical network with the operation and maintenance and internet service fees held constant. The time period of three years is assumed based on the construction period of current DMN. Operation period in each scenario is assumed at the same time length – ten years, which is the lifespan of equipment. The operation period includes the new operation and maintenance for the extended network and internet services fees. The operation period does not include any additional construction costs. Only the new operation and maintenance rate per mile, cash reserve, and internet services fee are considered during the operation period.

Potential grant opportunities are provided for each scenario, except Scenario 1, to alleviate the cost burden of expansion. Scenario 1 does not include any construction period; therefore, it is excluded from the grant opportunities. The main sources of capital inflow are separated into four categories: grants, contributions from anchor members and new associate members, and income from IRU contracts. We assume new anchor and associate members contribute more than current members during the construction phase because current anchor members covered the original network construction costs. We also assume IRU contractors contribute a majority of the cash inflow during the operation stage since they will be utilizing the network to deliver services. New members cover the majority of expansion cost for three years to match the initial investment time frame original members. Current member contributions are frozen at \$7,500 for the construction period, which is the current membership rate. Then the member contribution increases proportionally to cover operation and maintenance of the new network. A maximum threshold is placed to ensure the current members are not overburden with increasing operation and maintenance costs. The maximum threshold for the member contribution is \$15,000, which is double the current contribution. The gap

## Appendix 1 - Report Methodology (Continued - 4)

between cash outflow and the membership contributions will be filled by IRU contract income.

To examine whether it is financially feasible for IRU contractors to cover the remaining capital outflow gap, we conducted research on the current IRU market rate, which is recommended in Chapter 6. In addition, based on the IRU rate, we provide break-even strands that DMN needs to contract out to cover the capital outflow. The new IRU rate is based on market analysis of similar IRUs in other communities.

### A1.8 Scenario Mapping

ArcGIS 10.2 was used to create and manipulate data. The Iowa Geographic Information System (GIS) data repository was the only resource for map data, except for the basemap (Dark Grey Canvas) created by ESRI. The following information is the coordinate system and project for the data;

Coordinate System: GCS\_North\_American\_1983, Projected Coordinate System: NAD\_1983\_StatePlane\_Iowa\_North\_FIPS\_1401\_Feet,

Projection: Lambert\_Conformal\_Conic.

The mapping files downloaded from the Iowa GIS Data Repository included; all roads, road right of ways, municipal boundaries, City of Decorah parcels, and Winneshiek county zoning classifications. The Decorah MetroNet partners provided a copy of the current fiber-optic infrastructure.

For all scenarios, it was assumed that the most efficient pathway to install fiber infrastructure was in the road right-of-way (ROW). This is because there is no need to purchase appropriate easements or other governmental tools to acquire land rights. Therefore, the shortest routes to intended destinations were based on the use of road centerlines. All fiber distances are intended to be estimates for the financial model calculation and analysis. In all scenarios, fiber to the premises (FTTP) has not been taken into account. Therefore, an expert in fiber-optic engineering and planning should be contacted for the development of formal expansion routes.

For scenario 1: no change scenario, no information was manipulated. Roads, municipal boundaries, grey canvas basemap, and the current MetroNet fiber-optic infrastructure. This information was displayed with an appropriate north arrow and scale bar for reference.

For scenario 2: residential Decorah, roads, ROWs, municipal boundaries,

current MetroNet network and the grey canvas basemap were used. All parcels were added to the dataset and clipped to the Decorah municipal boundary using the “clip” tool. Residentially zoned parcels were queried and extracted from the dataset. A “select by location” was created around the residential parcels to select any road segments that were within 100 feet of residential parcels. The resulting selection was turned into its own layer using the “create layer from selected features.” This new layer was renamed “Expansion Scenario (ES) 2” and these segments are the potential network expansion to reach residential parcels. Before it is complete, segments were removed using the “editor toolbar” in places where redundant service was being provided to a single parcel. Loops and rings of the network were maintained where possible to limit outages and increase reliability. This was a subjective process, in which liberties were taken by the cartographer. Line segments were added using the “editor toolbar” to ensure connection to the current MetroNet infrastructure, these were referenced with the ROW to ensure they were legal. These line segments were then “dissolved” to become a single entity to calculate the full mileage necessary for the expansion scenario.

For scenario 3: downtown Decorah businesses, the same process was used as in scenario 2. Except that instead of querying for residential parcels, only commercial parcels were used. From there the process of subjective selection for best fit routes was conducted and an overall estimate of fiber mileage was calculated.

For scenario 4: Decorah Business Park data for roads, ROWs, municipal boundaries, current MetroNet network and the grey canvas basemap were used. An outline of the Decorah Business Park was created using the editor toolbar by referencing satellite imagery, parcel lines, and information from the Decorah Business Park homepage, provided by Winneshiek County Development, Inc. Road segments leading out to the business park were “selected” and extracted using “create layer from selected features.” These were dissolved to create the potential route leading to the Business Park.

For Scenario 5: Greater Winneshiek County, our team identified the shortest routes, according to mileage, using Google Maps, with municipal building or emergency service buildings as the access point in each municipality. The goal was to create interconnected loops, when feasible, between all incorporated municipalities in Winneshiek County. To do this, Data for roads, ROWs, municipal boundaries, current MetroNet network and the grey canvas basemap were used. Road segments on the identified routes

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## Appendix 1 - Report Methodology (Continued - 5)

were “selected” and extracted using “create layer from selected features.” These were then “dissolved” to calculate the full length of each route for financial model applications.

### A1.9 Financial Analysis

#### Methodology for Financial Analysis

The financial analysis is separated into two parts: cash outflow and cash inflow. Both parts are separated into two periods: construction and operation. The construction period is a 3 year build-out of the current network. The operation period is a 10 year time line post construction. Both time lines are based on the DMN’s previous network build-out. Data used in the financial analysis calculations were retrieved from the City of Decorah and the DMN.

The cash outflow consists of all costs to the DMN. The construction period includes the construction cost, operations and maintenance, internet service, and cash reserves. The expansion costs include the cost of equipment, cost of fiber, underground speculating services, construction labor, engineering services, knifing/boring costs, and fiber testing. The operation and maintenance costs are based on the current 11 mile network. The cash outflow during the operation period includes operation and maintenance costs for the new network, internet service fees, and cash reserves.

The cash inflow includes all member contributions, grant dollars, and IRU revenues. The construction period for the cash inflow are separated into all grant and no grant situations, creating a projected range of member contributions required for each scenario.

During the construction period, it is assumed that all new anchor and associate members pay the cost of constructing the new network. New members cover expansion costs, similar to the original anchor members during the initial investment. Each of the current members contribute the current annual rate of \$7,500 during the construction period. Associate members for both the construction and operation periods pay 50% of each anchor member contribution, as per Chapter 6.3 recommendations.

The cash inflow operation period includes member contributions and IRU revenue. The anchor member contributions were capped at a maximum threshold of \$15,000. The cap was created to lower the financial hardship

on DMN members. The remaining difference between the cash inflow and outflow is distributed to the IRU income until the net cash flow equals zero.

#### Potential New Members and IRU Contracts

The financial model assumes under these new organization conditions that there will be an increase in new members and IRU contracts. Membership for the 28E is restricted to non-profit, quasi-governmental, or governmental organizations. Therefore, all new, potential members were one of these three organization types. A list of organizations was retrieved from the Decorah Area Chamber of Commerce (Decorah Area Chamber of Commerce, 2016). All organizations along each scenario build-out were considered associate members in the financial model. The only organizations considered potential anchor members were the City of Calmar and Northeast Iowa Community College based on conversations with the DMN board.

The new IRUs in each scenario are based on the total number of broadband providers in the build-out area. The broadband provider total is based on Connect Iowa data.

#### IRU Break-Even

Since a large portion of the cash inflow operation period relies on IRU revenue, a break-even analysis was performed to identify the number of strands and length that would need to be contracted out to meet the cash inflow needs. The DMN has proposed opening 48 strands of fiber for IRU contracts,. Therefore, 48 strands is the maximum threshold for the break-even calculation. The IRU strands are presented in 1 mile increments unless the calculation exceeds the 48 strand threshold. If the strands exceed the threshold, then the mileage unit will change to 25% of the network after expansion. The break-even calculation uses the rate of \$125 per strand/per mile/month, which is based on market analysis (Appendix 11).

## Appendix 2 - Residential Telecommunications Survey (Continued on next page)



### RESIDENTIAL TELECOMMUNICATIONS SURVEY

*THE CITY OF DECORAH & WINNESHIEK COUNTY*

Dear Resident of Winneshiek County,

The City of Decorah and Winneshiek County, in conjunction with The University of Iowa and the Iowa Initiative for Sustainable Communities, are interested in telecommunication services and your potential interest in high-speed, fiber-optic internet, cable television, and phone access. The results will be used to help evaluate telecommunications policies and opportunities. Your input is greatly appreciated.

The completed survey should be returned to the nearest library or Decorah City Hall by December 11<sup>th</sup>, 2015 in the envelope provided. The team from the University of Iowa and the Iowa Initiative for Sustainable Communities will tabulate the results of the survey and present them to the partners of the current MetroNet fiber-optic telecommunications network. All information recorded is confidential and responses will be kept anonymous.

A **high-speed, fiber-optic network** is a form of internet service technology. Using glass fibers to transmit light to transfer data at faster speeds than those offered by traditional methods (i.e. coaxial cable, satellite, and dial-up services). Using a network of in-ground or above-ground fibers, an area can achieve higher speeds for internet, cable, and telephone.

Thank you for taking the time to participate in the survey.

**All responses are strictly confidential and will remain anonymous.**  
**[Please submit one (1) survey per household]**



**Question 1:** Which of the following electronics do you have in your home and how many?

Type of Electronic Device	Number of Devices
Laptop computer	0 1 2 3 4 5+
Desktop computer	0 1 2 3 4 5+
Ipad / tablet / other handheld device	0 1 2 3 4 5+
Smartphone (Cell Phone with Internet Access)	0 1 2 3 4 5+
Electronic Reader (E-Reader)	0 1 2 3 4 5+
Other – please specify:	0 1 2 3 4 5+

**Question 2:** Do you use a landline telephone at home?  YES  NO

**Question 3:** What television services do you have in your home? (Check all that apply)

- Cable  Other - Please Specify: \_\_\_\_\_  
 Satellite  None

**Question 4:** Do you have internet access at home?  YES  NO

- If yes, what is the speed of your internet? \_\_\_\_\_ MB/s (megabytes per second)  
 How satisfied are you with the current speed and capacity of your internet?

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 5:** What do you and anyone in your household use the internet for? (Check all that apply)

- Checking email
- Browsing the internet
- Information gathering
- Social media
- Online shopping
- School work (example: kindergarten, elementary, middle, high school)
- College and advanced educational resources (example: continuing education, technical college, university)
- Entertainment (example: Netflix, Hulu, other)
- Online healthcare (example: e-check-ups, e-visits)
- Work related tasks
- Selling goods online (example Amazon, Ebay, Etsy, other)
- Other – please specify \_\_\_\_\_

# Appendix 2 - Residential Telecommunications Survey

**Question 6:** How many people in your household use a computer at home for work purposes? \_\_\_\_\_

**Question 7:** How often do people in your household use the internet for work?

Person 1:	<input type="checkbox"/> Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Bi-monthly	<input type="checkbox"/> Monthly	<input type="checkbox"/> Yearly	<input type="checkbox"/> Never
Person 2:	<input type="checkbox"/> Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Bi-monthly	<input type="checkbox"/> Monthly	<input type="checkbox"/> Yearly	<input type="checkbox"/> Never
Person 3:	<input type="checkbox"/> Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Bi-monthly	<input type="checkbox"/> Monthly	<input type="checkbox"/> Yearly	<input type="checkbox"/> Never
Person 4:	<input type="checkbox"/> Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Bi-monthly	<input type="checkbox"/> Monthly	<input type="checkbox"/> Yearly	<input type="checkbox"/> Never

**Question 8:** How often do you or anyone in your household sell goods or services online? (Choose one)

<input type="checkbox"/> Daily	<input type="checkbox"/> Weekly	<input type="checkbox"/> Twice a month	<input type="checkbox"/> Once a month
<input type="checkbox"/> Once every 6 months	<input type="checkbox"/> Once a year	<input type="checkbox"/> Over a year ago	<input type="checkbox"/> Never

**Question 9:** In a typical month, what percentage of your household income do you or anyone in your household receive from selling goods and services online? \_\_\_\_\_ %

**Question 10:** Have you made a service call to your internet provider in the past 6 months to resolve an issue?  YES  NO

- “If yes”**
- How many calls did you have to make to your provider to resolve your issue? \_\_\_\_\_
  - On average, how long did you have to wait for your issue to be resolved? On average, how long did you have to wait for your issue to be resolved?  
\_\_\_\_\_ Day(s) \_\_\_\_\_ Hour(s) \_\_\_\_\_ Minute(s)
  - How satisfied were you with the level of service you received?

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 11:** How much do you currently pay for internet services? \$ \_\_\_\_\_ per month

**Question 12:** Would you be interested in purchasing a high-speed fiber connection? (Check all that apply)

- |   |  |
|---|--|
| <input type="checkbox"/> <b>Yes</b> , because I <b>do not currently have access</b> to any internet providers       | <input type="checkbox"/> <b>No</b> , because I <b>am happy</b> with my current internet provider |
| <input type="checkbox"/> <b>Yes</b> , because I believe it would be <b>faster</b> than my current internet provider | <input type="checkbox"/> <b>No</b> , because I <b>do not wish to purchase</b> the internet       |
| <input type="checkbox"/> <b>Yes</b> , because I believe it would be <b>less expensive</b> than my current service   | <input type="checkbox"/> <b>No</b> , because I believe it would be <b>more expensive</b>         |

**Question 13:** How much would you pay per month for faster internet speeds through a high-speed, fiber-optic connection? \$ \_\_\_\_\_ per month

**Question 14:** Would your household be interested in purchasing cable television, a landline phone, and internet services through a fiber-optic network? (Choose one)

<input type="checkbox"/> Cable only	<input type="checkbox"/> Internet only	<input type="checkbox"/> Landline telephone only
<input type="checkbox"/> Cable & internet	<input type="checkbox"/> Cable & landline telephone	<input type="checkbox"/> Internet & landline telephone
<input type="checkbox"/> Bundle all three services		<input type="checkbox"/> None

**Question 15:** What is/are the occupation(s) of the working adult(s) (individuals over 16 years old) in the household? (Check all that apply)

- |   |   |
|---|---|
| <input type="checkbox"/> Management, business, and financial  | <input type="checkbox"/> Natural resources, farming, construction, and building maintenance |
| <input type="checkbox"/> Computer, engineering, architecture, social science, and physical sciences | <input type="checkbox"/> Manufacturing production, transportation, and material moving      |
| <input type="checkbox"/> Education, legal, social service, arts, and media                          | <input type="checkbox"/> Student  |
| <input type="checkbox"/> Healthcare practitioner, technical, and support                            | <input type="checkbox"/> Unemployed   |
| <input type="checkbox"/> Food service, security, custodial, and safety                              | <input type="checkbox"/> Not in the labor force   |
| <input type="checkbox"/> Sales and office administration  |   |

**Question 16:** How many people live in your household in each age category?

Years of Age	Under 5	6 to 14	15 to 17	18 to 24	25 to 44	45 to 64	Above 65
# in Household	_____	_____	_____	_____	_____	_____	_____

**Question 17:** What is the nearest major intersection to your household?

\_\_\_\_\_ (Street, Avenue, etc.) & \_\_\_\_\_ (Street, Avenue, etc.)

**Question 18:** What is the highest level of education of anyone in your household? (Choose one)

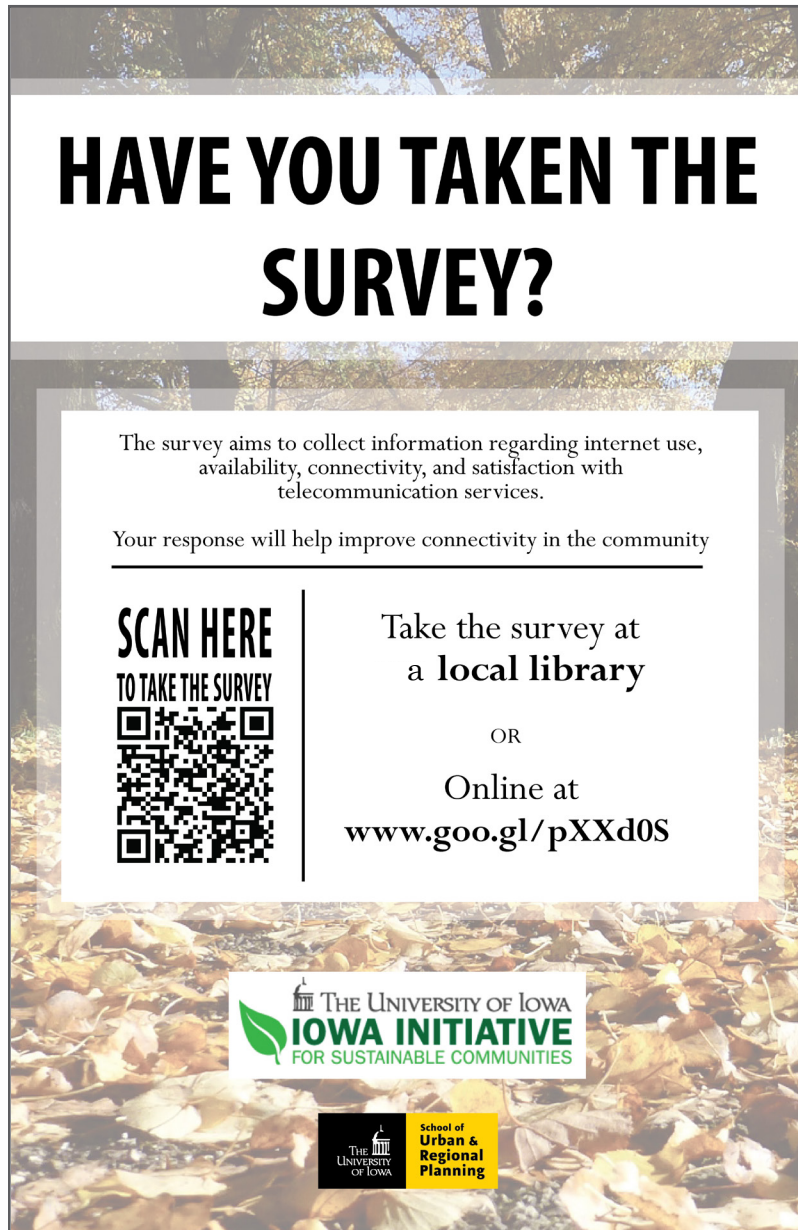
- |   |  |
|---|--|
| <input type="checkbox"/> Less than a high school graduate | <input type="checkbox"/> Bachelor's degree               |
| <input type="checkbox"/> High school or GED equivalent    | <input type="checkbox"/> Graduate or professional degree |
| <input type="checkbox"/> Some college                     | <input type="checkbox"/> Doctorate                       |
| <input type="checkbox"/> Associate's degree               |  |

**Question 19:** What was your gross (total) household income for the year 2014?

<input type="checkbox"/> Less than \$10,000	<input type="checkbox"/> \$10,000 - \$35,000	<input type="checkbox"/> \$35,000 - \$65,000
<input type="checkbox"/> \$65,000 - \$100,000	<input type="checkbox"/> \$100,000 - \$150,000	<input type="checkbox"/> Greater than \$150,000

**THANK YOU FOR PARTICIPATING**






# HAVE YOU TAKEN THE SURVEY?

The survey aims to collect information regarding internet use, availability, connectivity, and satisfaction with telecommunication services.

Your response will help improve connectivity in the community


**SCAN HERE  
TO TAKE THE SURVEY**



Take the survey at  
a **local library**

OR

Online at  
[www.goo.gl/pXXd0S](http://www.goo.gl/pXXd0S)







## HAVE YOU TAKEN OUR SURVEY?

We are asking residents of Winneshiek County to participate in our survey to better understand residential internet use, availability, and connectivity.

Graduate students at the University of Iowa are researching the quality of internet and telecommunication service in urban and rural areas of the County. The information collected will be used to determine areas of need and identify gaps in service provision.

Survey closes: **MARCH 1st, 2016**  
*[all survey responses are anonymous]*

Take it in person at your local library or Decorah City Hall	Take online at <a href="http://tinyurl.com/gp25xg1">tinyurl.com/gp25xg1</a>	Smart phone users can scan the QR code on the reverse side
--	--	--

### HAVE YOU TAKEN THE SURVEY?

Your response will help improve our understanding of Winneshiek's digital connectivity.

Smart Phone Users  
**SCAN HERE**



Urban & Regional Planning  
 The University of Iowa  
 5 W. Jefferson Street  
 Iowa City, IA 52422



## SMALL BUSINESS TELECOMMUNICATIONS SURVEY

THE CITY OF DECORAH & WINNESHIEK COUNTY

The City of Decorah and Winneshiek County, in conjunction with The University of Iowa and The Iowa Initiative for Sustainable Communities, in an effort to improve internet service opportunities in the region, are collecting information on current internet and telecommunication usage, satisfaction, and future needs by area businesses. This evaluation will aid in an analysis regarding the future of high-speed, fiber-optic internet services in the City of Decorah and Winneshiek County.

The completed survey should be returned to \_\_\_\_\_ by December 11, 2015 in the envelope provided. The team from the University of Iowa and the Iowa Initiative for Sustainable Communities will tabulate the results of the survey and present them to the partners of the current MetroNet fiber-optic telecommunications network. All information recorded is confidential and responses will be kept anonymous.

A **high-speed, fiber-optic network** is a form of internet service technology. Using glass or plastic fibers, light is used to transfer data at faster speeds than those offered by traditional methods (i.e. coaxial cable, satellite, and dial-up services). Using a network of in-ground or above-ground fibers, an area can achieve higher speeds for internet, cable, and telephone.

Thank you for your time and interest in improving internet services within the City of Decorah.

All responses are strictly confidential and will remain anonymous.  
[Please limit one (1) response per business location]



**Question 1:** How many people do you currently employ?

Job type	Full-time	Part-time	Temporary/seasonal
Number of employees	_____	_____	_____

**Question 2:** Do you currently have access to a landline telephone service at your place of business?

YES  NO

**Question 3:** Do you currently have access to cable or satellite entertainment service (i.e. television) at your place of business?

YES  NO

**Question 4:** Do you currently have internet access at your place of business?

YES  NO

**Question 5:** Do you provide internet access to the public or customers?  YES  NO

**Question 6:** How many employees, on average, utilize the internet simultaneously at your place of business? \_\_\_\_\_ (Number of employees)

**Question 7:** What is the speed of your internet? \_\_\_\_\_ MB/s (megabytes per second)

**Question 8:** How satisfied are you with the current speed and capacity from your internet provider?

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Question 9:** Has your company ever exceeded bandwidth restrictions or incurred data limit overages?

YES  No

**Question 10:** Do you anticipate needing more broadband speed or capacity in a year to 5 years?

YES (\_\_\_\_\_ # of years)  No

**Question 11:** In the past 6 months, have you or your business had to make a service call to your provider to resolve an issue?  YES  No

If yes →

- ☞ How many calls did you have to make to your provider to resolve your issue?  
\_\_\_\_\_ # of calls
- ☞ On average, how long did you have to wait for your issue to be resolved?  
\_\_\_\_\_ Days \_\_\_\_\_ Hours \_\_\_\_\_ Minutes
- ☞ How satisfied were you with the level of service you received?

Very dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Very satisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix 4 - Business Telecommunications Survey

**Question 12:** How much do you currently pay for internet service?  
\$ \_\_\_\_\_ per (Circle one: month / half a year / year)

**Question 13:** Would you be interested in purchasing internet services if it were provided with a fiber-optic network? (Check all that apply)

- |   |  |
|---|--|
| <input type="checkbox"/> <b>Yes</b> , because I <b>do not currently have access</b> to any internet providers       | <input type="checkbox"/> <b>No</b> , because I <b>am happy</b> with my current internet provider           |
| <input type="checkbox"/> <b>Yes</b> , because I believe it would be <b>faster</b> than my current internet provider | <input type="checkbox"/> <b>No</b> , because I <b>do not wish to purchase</b> the internet                 |
| <input type="checkbox"/> <b>Yes</b> , because I believe it would be <b>less expensive</b> than my current service   | <input type="checkbox"/> <b>No</b> , because I believe it <b>would more expensive</b> than my current plan |

**Question 14:** How much would your business pay per month for a connection to a high-speed, fiber-optic network? \$ \_\_\_\_\_ per month

**Question 15:** Would your business be interested in purchasing cable television, a landline telephone, internet services, or various bundles of service through a fiber-optic network? (Choose one)

<input type="checkbox"/> Cable only	<input type="checkbox"/> Internet only	<input type="checkbox"/> Landline telephone only
<input type="checkbox"/> Cable & internet	<input type="checkbox"/> Cable & landline telephone	<input type="checkbox"/> Internet & landline telephone
<input type="checkbox"/> Bundle all three services		<input type="checkbox"/> None

**Question 16:** In 2014, what was your gross (total) sales? \$ \_\_\_\_\_

### Business Information

Name of business or agency: \_\_\_\_\_

Street address: \_\_\_\_\_  
\_\_\_\_\_

City, State, ZIP \_\_\_\_\_

Telephone: \_\_\_\_\_

Name of person completing survey: \_\_\_\_\_

Title or position of person completing survey: \_\_\_\_\_

E-mail of person completing survey: \_\_\_\_\_

*\*(The E-mail address provided will only be used for survey follow-up, if required. All information is confidential and E-mails will not be distributed)*

THANK YOU FOR TAKING PART IN OUR SURVEY



## MAJOR EMPLOYER INTERNET INTERVIEW SCRIPT

*The City of Decorah & Winneshiek County*

Good Morning/Hello/Good Afternoon

My name is \_\_\_\_\_. I am conducting interviews with businesses in Winneshiek County as part of a project researching internet services and economic development. We are interested in interviewing businesses, such as yours, to establish conditions and levels of satisfaction with your current internet services and what your future business needs may be. All your responses will not be specifically tied to your business.

Have you had the opportunity to complete our business survey? (If No, tell them, we can complete the survey after, or they can complete it online at their convenience.)



### Business Information and Preferences

1. How would you classify the business sector of your operation? Or what type of good or service does your business produce?
  
2. For data reference purposes, what is the industry category of your business?

<input type="checkbox"/> Agriculture, Forestry, Fishing, & Hunting	<input type="checkbox"/> Management of Companies
<input type="checkbox"/> Construction	<input type="checkbox"/> Admin Support and Waste Mgmt
<input type="checkbox"/> Wholesale	<input type="checkbox"/> Educational Services
<input type="checkbox"/> Retail	<input type="checkbox"/> Health Care and Social Assistance
<input type="checkbox"/> Transportation & Distribution	<input type="checkbox"/> Arts, Entertainment, and Recreation
<input type="checkbox"/> Information	<input type="checkbox"/> Accommodation & Food Services
<input type="checkbox"/> Finance and Insurance	<input type="checkbox"/> Other Services
<input type="checkbox"/> Real Estate	<input type="checkbox"/> Public Administration
<input type="checkbox"/> Professional, Scientific, & Technical	<input type="checkbox"/> Unsure:
Other: _____	

Other: \_\_\_\_\_



Appendix 5 - Major Employer Internet Interview Script (Continued - 3)

Internet Service

\*\*\*\*\*Only ask if no survey for the business is available\*\*\*\*\*

1. Do you currently have access to the internet? If yes, what is the speed of your internet?    \_\_\_\_\_ / \_\_\_\_\_ Mbps (download / upload)
2. How much do you currently pay for internet service?  
\$ \_\_\_\_\_ per (Circle one: month, half a year, year)
3. How much would your business pay per month for a connection to a high-speed, fiber-optic network?  
\$ \_\_\_\_\_ per (Circle one: month, half a year, year)

\*\*\*\*\*

9. Hypothetically, if you were unable to secure high-speed, affordable internet service, how large of an impact would it make on your business in the following areas: from 1 being “No Impact” to 5 being “High Impact”
  - a. \_\_\_ Impact on cost of doing business
  - b. \_\_\_ Impact on ability to increase sales
  - c. \_\_\_ Impact on worker productivity
  - d. \_\_\_ Inhibit or prevent taking advantage of business opportunities
  - e. \_\_\_ Impact on expansion/growth plans
  - f. \_\_\_ Impact on our ability to adequately train our employees
  - g. \_\_\_ Impact our consideration of relocating the business where more band width is available

Labor Force

10. How important are the following employee skills and knowledge to your business:

1 being “Not Important” and 5 being “Very Important”

- a. \_\_\_ Global awareness
- b. \_\_\_ Computer (Basic software skills and operation)
- c. \_\_\_ Creative thinking
- d. \_\_\_ Computer programming
- e. \_\_\_ Teamwork
- f. \_\_\_ Working with diverse individuals
- g. \_\_\_ Critical thinking
- h. \_\_\_ Communicate clearly
- i. \_\_\_ Technology support
- j. \_\_\_ Work independently
- k. \_\_\_ Marketing
- l. \_\_\_ Website design and management
- m. \_\_\_ Leadership
- n. \_\_\_ Financial and business management
- o. \_\_\_ Work ethic
- p. \_\_\_ Other: (List)

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## Appendix 5 - Major Employer Internet Interview Script (Continued - 4)

11. What software do employees use to accomplish tasks?

a. Daily: \_\_\_\_\_  
\_\_\_\_\_

b. Occasionally: \_\_\_\_\_  
\_\_\_\_\_

12. What software do your employees NEED to conduct business?

13. Do you allow employees to work from home, or telecommute? Why?

a. If yes, how many employees work from home?

i. Full time: \_\_\_\_\_

ii. Part time: \_\_\_\_\_

iii. Seasonal: \_\_\_\_\_

14. If your employees had high-speed internet at home, would you encourage working from home more? Why?

**THANK YOU FOR YOUR TIME.**

# Appendix 6 - Visioning Session Packet

## Visioning Winneshiek County's Digital Future

January 21<sup>st</sup>, 2016

Thank you again for attending today's visioning session. We will present a series of questions to identify county priorities concerning internet service. We ask that you follow some ground rules while participating:

- Respect the input of other group members
- Be prepared to share or expand on your ideas
- At the end of each question or question set, we will ask one or two groups to share your responses

Question 1: What does the future of Winneshiek County look like in 10 to 20 years?

Talking points:

- Population size
- Business environments
- The sectors you work with
- Others

Question 2: Does internet and digital technology play a key role in Winneshiek County's future? How?

Talking Points

- In the workplace
- In the home
- In the classroom
- Other

Question 3: Why is broadband important for Winneshiek County, as compared to other technological investments?

Talking points

- Growth
- Education
- Community development

Question 4: Using the maps provided, what areas in the county are affected by a lack of broadband service?

Question 5: What are barriers preventing broadband access and use?

Question 6: What community assets and opportunities could be leveraged to create the future we want and overcome barriers?

Can be:

- Groups of people
- Fiscal resources
- Government
- Other

## VISIONING SURVEY

1. Did you feel you could share your opinion openly during the event? YES NO
2. Do you think a group discussion was effective in addressing these issues? YES NO
3. In order to improve the digital future of Winneshiek County, what resources could you individually or as an organization commit?
4. Is there any additional information you wish to share with the University of Iowa group? (Feel free to use the back)



## Appendix 7 - Interview Questions for Professionals (Continued on next page)

### Summary of Expert Interviews

Due to the complex nature of the issue surrounding organizational structures and legal liabilities, our team enlisted several professionals and experts in their field to define what the MetroNet partnership should be aware of moving forward. A variety of professionals were contacted in the areas of utilities engineering, municipal administration, telecommunications utility management, and telecommunications law. Each individual provided advice related to similar topics and themes.

Legal liability and avoiding litigation was a common concern, though most saw the open access model as a way to circumvent a lot of potential issues. By practicing fair and equal treatment of all potential IRU contract holders, they are giving equal access to their network within a determined capacity.

There was also stress placed on being prepared for “push-back” from incumbent providers in the market. Emphasis was placed on the way these entities will use media, the market, and legal procedures to slow the process of expansion and network provision. Time and again, each interviewee stressed that the MetroNet board should consult experienced legal services.

It was also made clear that the MetroNet board should make amendments to their 28E agreement. The amendments should explicitly state the role and responsibility of board members in the future. By doing so, they will dictate the authority and future motivations for the MetroNet. The locus of control and authority of the MetroNet, by being define within the 28E, should eliminate most risks related to authoritative issues. Regarding amendments to the 28E, it was also advised that any considerations that the MetroNet board sees as a long term plan should be amended into the agreement now rather than continually amending the document.

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A special thanks is extended to those professionals and experts who volunteered their time to assist our team in strengthening this project through their opinions and advice. The following list is the individuals interviewed and when those interviews occurred.

Jeff Schott, MA – Director of the Institute of Public Affairs at the University of Iowa

Richard Fosse – Former Director of Public Works for the City of Iowa City / Civil Engineering Faculty at the University of Iowa

Curtis Dean, MA – Broadband Services Coordinator at the Iowa Association of Municipal Utilities

Robert Houlinhan – Director of Cedar Falls Municipal Utility

Ivan Webber – Attorney and Shareholder at Ahlers Cooney, P.C.

### Interview Questions &

#### Preliminary questions for Jeff Schott, Richard Fosse, and Curtis Dean

##### About the 28E Agreement:

- Who has the authority to condemn an easement on behalf of municipal utility or 28E?
- Who would have the ownership of property?
- Who is liable if the system fails temporarily?

##### Concerns for fiber-optic as a municipal utility:

- What are the legal or organization barriers for a public utility to provide telecommunications services?
- What if a competitor enters in the market?
- Is the risk in the interest of the city? (i.e. Case of Waverly, IA).
- How do utilities determine the number of staff required to operate effectively?
- Where do utilities have the right to build or install their equipment?
- What relationships or agreements do utilities need to extend beyond their municipal boundaries or can they?
- What legal barriers exist when a public utility is working with private providers?
- What difference can make the type of organization the city is working with?
- Are public utilities considered monopolistic?
- How is the price of a utility set?
- In your experience what are some of the greatest difficulties when operating a public utility?

##### Moving forward

- What would happen if the utility is to fail?
- Who would lawsuits fall upon if the system results in losses or damages?
- We should be providing a list of recommendations for adding to their city/county and 28E documentation

## Appendix 7 - Interview Questions for Professionals (Continued - 2)

<p><b>Jeff Schott - Director of the Institute of Public Affairs at the University of Iowa, January 22<sup>nd</sup>, 2016</b></p> <p>On a 28 E agreement it is important to focus on:</p> <ul style="list-style-type: none"> <li>• Regarding: Who has the authority to condemn an easement on behalf of municipal utility or 28E?</li> </ul> <p>If the agreement of expansion will be with the utility board, than it will be the authority.</p> <p>The agreement needs to be drafted carefully.</p> <ul style="list-style-type: none"> <li>• Ownership of property – utilities are usually owned by the city. MetroNet would own its property, but contract services through the Utility</li> <li>• Who is liable if the system fails temporarily?</li> </ul> <p>Concerns for fiber optic as a municipal utility:</p> <ul style="list-style-type: none"> <li>• What if a competitor enters in the market?!</li> <li>• Is the risk in the interest of the city? (i.e. case of Waverly).</li> <li>• Telephone is a monopoly, not sure if the bundle (Internet, TV, and Telephone) is a good idea.</li> </ul> <p>Reference:</p> <ul style="list-style-type: none"> <li>• Alher’s Law firm in Des-Moines</li> </ul> <p>Moving forward</p> <ul style="list-style-type: none"> <li>• What would happen if the utility is to fail?</li> <li>• Who would lawsuits fall upon if the system results in losses or damages?</li> <li>• We should be providing a list of recommendations for adding to their city/county and 28E documentation</li> </ul>	<p><b>Richard Fosse - Former Director of Public Works for the City of Iowa City / Civil Engineering Faculty at the University of Iowa, January 22<sup>nd</sup>, 2016</b></p> <p>Important to focus on ownership:</p> <ul style="list-style-type: none"> <li>• The land is owned by the city, but this is different from rights of easement. For that we need to reference to “Utility Easements”. The bundle of rights might be different from place to place.</li> </ul> <p>Concerns:</p> <ul style="list-style-type: none"> <li>• Maintenance</li> <li>• Defining responsibilities and risks.</li> <li>• How the rate will be adjusted overtime.</li> <li>• They can consider making a partnership with whoever owns the electrical service.</li> <li>• Being only an internet provider would avoid competition from the other players in the game, because they still provide TV and telephone. Steers clear of retributive competition.</li> </ul> <p>Next steps:</p> <ul style="list-style-type: none"> <li>• Trying to get in touch with the IAMU, Iowa Association of Municipal Utilities</li> <li>• Investigate city / county easement practices and right of ways (ROW) for telecommunications</li> <li>• Search for an overlap in city / county employees who would know how to mend or work with fiber technology already. Electric? Etc...</li> </ul>
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## Appendix 7 - Interview Questions for Professionals (Continued - 3)

### Curtis Dean, MA – Broadband Services Coordinator at the Iowa Association of Municipal Utilities, February 3<sup>rd</sup>, 2016

#### Important

- MetroNet presents a unique situation with its 28E, as compared to a utility
- It is best to avoid duplicate services running side by side. “it would be ineffective to have two fiber cables lying next to each other and dig two separate holes” (In relation to not cooperating with local incumbent providers).

#### Concerns

- If MetroNet is to lease its access through an IRU to the Utility, it must make it open to any and all competitors and show no favorites.
  - No preferential treatment, this will help mitigate litigation
  - Example is the City of Iowa City vs. Mediacom. Currently suing over franchise rights
    - “This is a null effort meant to slow down the development and waste city money.”
- Be aware of franchises: Cities and political subdivisions are not required to file for a franchise in order to distribute television, internet or phone services, but must abide by all franchise law. If the city wants to extend its utility to another municipality, then it must purchase franchise rights, or bring them into the 28E agreement.
- BTOP Grant: Need to be aware of BTOP restrictions. Check and see if the BTOP requires any action by the MetroNet to serve a certain demographics or purposes.
- 28E cannot receive loans or utilize bonding effectively.

#### TO DO:

- Investigate franchise law (Not really for us, but for MetroNet to make sure they are safe.
- CONTACT: Ivan Webber @ Alhers Law Firm - Des Moines
- Check BTOP grant requirement.
- Look in 28E Financial restrictions

### Conference call with Robert Houlihan, Director of Cedar Falls Municipal Utility:

- What is the relationship (if any) between the utility and other providers in the area?
- Does the utility provide service outside of the municipal boundary?
  - If yes, how do they by-pass the spatial restriction?
- What type of financing does the utility engage in to construct the network and replace equipment?
- Historically, what types of funds has the utility pursued and acquired?
  - Initial Installation?
- Were bonds the only initial funding?
  - Grants
- How have you organized your technical staff?
  - Is there a system admin, IT Directors, or similar position?
  - What is a rough estimate of compensation for this position?
- Do you have any leases or IRU to third party users or parties outside of the Utility?
  - Did you use any "payment upfront" practice? How did that worked out? (With long term leases)
- Does your city use right of ways, easements, or other for the infrastructure?
- Did you encounter any problems during the expansion, related to liabilities and responsibilities?
- We know the Broadband Municipal Utility is a separate branch from the Municipality (as mentioned in the email of Mr. Ron Gaines), can you clarify us more on this relationship?

## Appendix 7 - Interview Questions for Professionals

<p><b>Preliminary Questions and answers for Ivan Webber</b></p> <p><b>Ivan Webber – Attorney and Shareholder at Ahlers Cooney, P.C., February 3<sup>rd</sup>, 2016</b></p> <ul style="list-style-type: none"><li>• Is the Open Access the only option of avoiding legal mitigation?<ul style="list-style-type: none"><li>○ <i>Answer: Yes &amp; No</i></li></ul></li><li>• Are there any alternative models?<ul style="list-style-type: none"><li>○ <i>Answer: While open access is the cleanest and easiest to understand and implement. There is one other model used, known as the “Rights of Use.”</i></li><li>○ <i>The City of Harlan, Iowa currently uses this model. It is the only use of it in Iowa that Ivan recalled.</i></li><li>○ <i>Currently Indianola, Iowa uses an open access policy, they provide equal access to Mediacom, century link, and lisco. (Follow-up research found that Indianola is a municipal utility providing fiber to the premise service.)</i></li></ul></li><li>• What specific sections and considerations need to be included in a new 28E document to accommodate an Open Access Policy?<ul style="list-style-type: none"><li>○ <i>Answer: All members of a 28E agreement must have the same power in order to use specific governmental or non-profit abilities. (An example being: eminent domain. The right to use eminent domain is lost when a non-governmental institution joins the 28E because the other parties do not have this right.)</i></li><li>○ <i>Might be beneficial to set up a different 28E for different goals.</i></li><li>○ <i>He mentions that is why most operations of this nature include their electrical utilities. Because then they can use power line stringing without costs. (but we do not have a municipal electric system)</i></li><li>○ <i>Remember that Iowa is a Home Rule state, so you really govern yourself on this as long as you don't violate Iowa state code or Iowa constitutional law, or federal law</i></li><li>○ <i>1996 Telecommunications Act: Prohibits controlling access to the right of way (equal access). Meant to bring down barriers of entry into the telecommunications industry.</i></li><li>○ <i>Article 3, section 31 of state constitution: Public Purpose doctrine: All fund and efforts of a 28E must serve a public purpose</i></li><li>○ <i>Equal protection and non-discriminatory practices is not in the Iowa Code, but has been supported on two occasions at the Iowa Supreme court.</i></li></ul></li></ul>	<ul style="list-style-type: none"><li>• Is there a resource or framework for required sections in the Open Access Policy that you can recommend?<ul style="list-style-type: none"><li>○ <i>Answer: Cannot legally respond</i></li></ul></li><li>• The MetroNet has currently 2 IRU agreements. From your experience with Open Access model, do these agreements need to be in line with new open access policy and pricing scheme?<ul style="list-style-type: none"><li>○ <i>Answer: Cannot legally respond</i></li></ul></li><li>• Can the 28E set a hierarchic partnership?<p>For example, the MetroNet has Anchor members: equal partners and board member status. For smaller organizations, can there be a second tier of membership with less investment and corresponding influence.</p><p>If yes, can the 28E write in language about two different membership payments for the primary and secondary board members? Can that membership be set annually or need to be decided for an extended amount of time?</p><ul style="list-style-type: none"><li>○ <i>Answer: Yes, 28Es operate however you structure them.</i></li><li>○ <i>But this might be an area where it is useful to have separate 28Es due to the separation of power in the groups.</i></li></ul></li></ul>
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## Appendix 8 - Management Table

### 4.3 Management and Administration

As the DMN expands in the future, the time burden placed on the board members is likely to increase. Therefore, pending available funds, it would be beneficial for the DMN to hire a network assistant or manager. The table below highlights a number of possible positions, responsibilities, salary, and benefits.

Employment Position	Job Description Responsibilities	Authority	Salary	Value of Benefits
Information Technology (IT) Director	Maintains network connectivity, Oversees technical issues, and proposes future technological infrastructure	Systems administration, contract service maintenance, report to DMN board chair	\$63,000 - \$83,000	\$16,500 - 21,800
Administrative Assistant	Manage IRU contracts, advertises access to DMN, works with incoming members and IRU holders, and keeps network records	Authority to issue and manage contracts	\$42,000 – \$53,000	\$11,800 – 15,000
Executive Vice President	Oversees contracts, technological issues, and presents future planning strategies and best-practices	Manages resources, determines necessary budget for new technology and products, and reports on board assigned projects	\$150,000 – \$184,000	\$57,300 – 70,300

There are three main position types DMN could hire for in the future. The value of benefits is a combination of 401K, healthcare, pension, and vacation time

Source: (Salary.com, Inc., 2016)

Appendix 9 - Available Funding // Grants (Continued on next page)

Program	Agency	Objectives	Uses	Applicants Requirements	Eligible Area	Amount of Funds	Scenarios
Community Connect Grants	USDA	To deliver broadband services to rural areas that are not yet economically viable	Construction and facilities	State and local government, federally recognized tribes, non-profits, and for-profit corp.	Rural areas that lack any existing broadband speed of at least 3 Mbps (download plus upload) is eligible.	\$3,000,000 cap; matching funds of at least 15% from non-federal sources	5
Connecting Iowa farms, schools, and communities	Iowa Gov	To reduce or eliminate cost of installing broadband infrastructure in Iowa	Installation of broadband infrastructure that facilitates broadband service at or above 25 megabits per second of download speed and 3 megabits per second of upload speed in Iowa	Communications service provider	Open	Maximum of 15 percent of the proposed project	2,5
Distance Learning & Tele-medicine Grants	USDA	To help rural communities connect to other communities and the world using telecommunications	Interactive home and terminal equipment. Inside wiring and similar infrastructure. Instructional programming and technical assistance and instruction for using eligible equipment.	State and local government, non-profit, for-profit, and consortium of all of the above	Eligible applicants include most entities that provide education or health care	\$50,000 to \$500,000 with 15% matching funds from non-federal sources	2,5

Appendix 9 - Available Funding // Grants (Continued - 2)

Program	Agency	Objectives	Uses	Applicants Requirements	Eligible Area	Amount of Funds	Scenarios
Rural Business Enterprise Grants (RBEG) Program	USDA	To finance and facilitate development of small and emerging rural businesses and help fund distance learning networks, and help fund employment related adult education programs.	Construction, training and technical assistance; distance adult learning for job training and advancement; and project planning.	Rural public entities, Indian tribes, and rural private non-profit corporations are eligible to apply for funding.	For the purposes of this program a "rural community" is an area where the population does not exceed 50,000, or is next to a city or town with more than 50,000 people.	\$10,000 up to \$500,000	2,3,4,5
Rural Business Opportunity Grants (RBOG)	USDA	To promote economic growth in rural communities by supporting training and technical assistance for business development and to assist with regional economic development planning	Market development and feasibility studies; business training, including leadership development and technical assistance for entrepreneurs; establishing business incubators, including commercial kitchens.	Local governments, economic development organizations, non-profit organizations, Indian tribes, and cooperatives are eligible to apply.	For the purposes of this program a "rural community" is an area where the population does not exceed 50,000, or is next to a city or town with more than 50,000 people.	\$100,000	2,3,4,5

Appendix 9 - Available Funding // Grants (Continued - 3)

Program	Agency	Objectives	Uses	Applicants Requirements	Eligible Area	Amount of Funds	Scenarios
Rural Community Development Initiative (RCDI) Grants	USDA	Assists organizations that provide technical assistance to other organizations to improve their ability to undertake housing, and community or economic development projects in rural areas.	Recipient provides technical assistance to organizations serving qualified rural areas.	Public or private organizations, including recognized Tribes, which have been organized at least 3 years and have experience working with eligible recipients	Rural area, city, and towns with population not exceeding 50,000 including urbanized areas.	\$50,000 to \$250,000	2,3,4,5
Rural Cooperative Development Grants (RCDG)	USDA	Establish and operate centers for cooperative development to improve the economic condition in rural areas. Improve operations of existing coops.	Conduct feasibility studies, business plans, and applied research as well as provide training and other technical assistance to new and existing cooperatives and businesses.	Non-profit corporations and institutions of higher education.	Any area except cities with populations over 50,000 or the adjacent urbanized area.	Maximum Grant Amount: \$200,000	3,4,5



Appendix 9 - Available Funding // Grants (Continued - 4)

Program	Agency	Objectives	Uses	Applicants Requirements	Eligible Area	Amount of Funds	Scenarios
Rural Business Development Grants (RBDG)	USDA	To promote sustainable economic development in rural communities with exceptional needs	Community economic development. Technology-based economic development. Feasibility studies and business plans. Leadership and entrepreneur training Rural business incubators. Long-term business strategic planning	Public bodies, nonprofit corporations, Indian tribes, institutions of higher education, and rural cooperatives are eligible to apply.	Rural communities where the population does not exceed 50,000 or is next to a city or town with a population exceeding 50,000.	Range from \$10,000 up to \$500,000.	3,4,5
Tech Hire Partnership Grants	DOL	Equip individuals with the skills to train workers for and connect them to jobs in IT, healthcare, advanced manufacturing, financial services, and broadband	Programming to expand access to accelerated learning, improve the likelihood that individuals complete training and enter employment, connect individuals with networking and job searching.	Must include at least one representative of each of the following three types of entities: a) the workforce investment system; b) education and training providers; and c) business-related nonprofit organizations. Must be public and non-profit based	Open	\$2 million to \$5 million	4,5

Appendix 9 - Available Funding // Loans (Continued on next page)

Program	Agency	Objectives	Uses	Applicants Requirements	Eligible Area	Amount of Funds	Scenarios
Farm Bill Broadband Loans & Loans Guarantees	USDA	To provide broadband service to rural areas	Construction, improvement, and acquisition of facilities required to provide service. The cost of leasing facilities required to provide service	Applicants must be corp, LLC, state or local government, or federally recognized tribe.	Proposed funded service areas must be completely contained within a rural area or composed of multiple rural areas. At least 15 percent of the households in the proposed funded service area are unserved. No part of the proposed funded service area has three or more incumbent service providers.	Composite economic life of the project plus 3-years	5
Rural Economic Development Program loans and grants	USDA	To finance economic development and job creation in rural areas	Feasibility studies, business startup or expansion costs, business incubators, revolving loan funds, and community facilities.	Public bodies, community-based non-profit corporations, and federally-recognized Tribes	Any area except cities with populations over 50,000 or the adjacent urbanized area.	Maximum of 75 percent of the proposed project	3,4,5

## Appendix 9 - Available Funding // Loans

Program	Agency	Objectives	Uses	Applicants Requirements	Eligible Area	Amount of Funds	Scenarios
Electric and Telecommunications Program direct loans and loan guarantees	USDA	To provide financial aid through direct and guaranteed loans for electric and telecommunications services	Generation, bulk transmission facilities, and power distribution. Enhance 911 service, digital switching, fiber optics, traditional telecommunications and broadband	For-profit entities, non-profit and cooperative associations, public bodies, and other utilities	Rural areas with populations of 5,000 or less	Varies	5
Telecommunications Infrastructure Loans & Loan Guarantees	USDA	To provide financial support for the improvement and increased access to telephone and broadband services	Funds may be used to finance broadband capable telecommunications service	Applicants can be state and local government, federally recognized tribes, non-profits, and coops.	Rural areas and towns with a population of 5,000 or less. Areas without telecommunications facilities or areas where the applicant is the recognized telecommunications provider are eligible	Varies	5

## Appendix 10 - IRU Market Analysis

Indefensible Rights of Use (IRU) Market Analysis				
Location	IRU Rate	Unit of Measurement	Time Restriction	Mileage Minimum
Baltimore, MD	\$ 250	/month/strand/mile	N/A	N/A
Kensington, MD	\$ 14	/month/strand/mile	20-year	N/A
DeKalb County, IL	\$ 750	/month/strand/mile	1-year	20 miles
	\$ 375	/month/strand/mile	5-year	20 miles
	\$ 250	/month/strand/mile	10-year	20 miles
	\$ 125	/month/strand/mile	20-year	20 miles
Eugene,OR	\$ 44	/month/strand/mile	N/A	N/A
Champagne,IL	\$ 125	/month/strand/mile	20-year	N/A
Menasha, WI	\$ 185	/month/strand/mile	3-year	N/A
Sacramento, CA	\$ 125	/month/strand/mile	Urban Areas	
	\$ 75	/month/strand/mile	Suburban Areas	
	\$ 60	/month/strand/mile	Exurban Areas	

The IRU rates across the nation differ significantly based on region, population density, volume of broadband demand, and number of incumbent providers. It is recommended to consult two or three interested parties to measure the willingness to pay, length of contract, and expected strands and mileage. The network that closely resembles Decorah is DeKalb County, IL. The lowest IRU rate for the DeKalb network was considered the market rate for Scenario 5 analysis because it is the lowest rate in the DeKalb pricing structure, yet it is still significantly higher than the current IRU rate for the Decorah MetroNet. This pricing scheme is competitive and can maintain adequate cash inflow for expanded operations of the future DMN network.

## Appendix 11 - Broadband Tracking Tools (Continued on next page)

### Broadband Tracking Tools

The following broadband tracking tools have been designed to identify, assess, and measure the economic benefits of fiber-optic broadband development. The packet includes:

- Business Site Visit Questions
- Business Entry Survey Questions
- Business Exit Survey Questions

These questions are related to business internet services and how they relate to the business' day-to-day activities, workforce, and expenses. These question can be added to current economic development documents. The questionnaires can be deployed by the economic development agencies in survey or interview format. It is recommended to deploy these questions whenever there is a business leaving the area, entering the area, or when visiting a business. The results will allow the Decorah MetroNet, and other economic development organizations, to begin the process of tracking the economic benefits of broadband. The type of study the city, county, or other organization wishes to pursue using the broadband tracking tools is dependent on the interests of that party.

### Additional Data Sources to Track Changes

It is also recommended in 5 years to redistribute and collect data from the amended residential and business surveys. The data collected in the 2016 Decorah MetroNet study and the data collected from redistributing the surveys could be used in a time-series study on broadband deployment.

Both the amended surveys and the data from tracking tools can be used in tandem with public industry and county-level economic data. When conducting the surveys or interviews it is best to include economic and business related questions to identify the type of industry, size of the firm, and type of ownership. If questions are not included with the internet related questions, public data could be included from the Bureau of Economic Analysis, Bureau of Labor Statistics, and United States Census.

### Business Site Visit Internet Related Questions

1. What is the speed and capacity of your internet connection? Utilize <http://www.speedtest.net/> for current test)

\_\_\_\_\_ (Mbps) upload \_\_\_\_\_ (Mbps) download \_\_\_\_\_ (G) capacity

2. Do you feel like you would benefit from higher internet speeds?

- YES
- NO
- UNSURE

3. Why or why not?

4. How much do you currently pay for internet connection? Please indicate if you have a bundle or internet service.

5. What percentage of your expenses is dedicated to internet services?

6. How significant is access to the internet to your daily business activities? On a scale of 1 being "Not significant at all" to 10 being "Very Significant".

Business Activity	1 Not significant at all	2	3	4	5 Neutral	6	7	8	9	10 Very Significant
Communication within the office										
Communication outside the office										
Selling goods/services										
Designing products										
Telecommuting										
Other: _____										

## Appendix 11 - Broadband Tracking Tools (Continued - 2)

<p>7. Are you currently connected to fiber-optic broadband?</p> <p style="padding-left: 40px;">YES (Proceed to Question 2)</p> <p style="padding-left: 40px;">NO (Proceed to Question 10)</p> <p><b>If "yes" to question 7, continue with the following questions.</b></p> <p>8. When did you switch to fiber-optic internet? (Date)</p> <p>9. What was your internet upload/download speed prior to switching?</p> <p style="padding-left: 40px;">_____ (Mbps) upload _____ (Mbps) download _____ (G) capacity</p> <p>10. What is the speed and capacity of your internet connection, now? Utilize <a href="http://www.speedtest.net/">http://www.speedtest.net/</a> for current test</p> <p style="padding-left: 40px;">_____ (Mbps) upload _____ (Mbps) download _____ (G) capacity</p> <p>11. How much did you pay for your previous internet connection? Please indicate if your service included telephone, television, or another type of service in addition to internet service.</p> <p><b>If "no" to Question 7, continue with the following questions.</b></p> <p>12. Have you even been connected to fiber-optic broadband?</p> <p style="padding-left: 40px;">YES (Proceed to Question 10)</p> <p style="padding-left: 40px;">NO (Proceed to Question 11)</p> <p>13. Why did you change from fiber-optic broadband to another service? (Mark all that apply)</p> <ol style="list-style-type: none"> <li>1. The businesses does not need internet</li> <li>2. No available fiber in the area</li> <li>3. Cost of fiber is too expensive</li> <li>4. Speeds did not meet the business' needs</li> <li>5. Other: _____</li> </ol>	<h3>Entry Interview Questions</h3> <ol style="list-style-type: none"> <li>1. Will this location be your:             <ol style="list-style-type: none"> <li>a. Headquarters</li> <li>b. Only location in Iowa</li> <li>c. Branch location</li> <li>d. Sole/Original location</li> <li>e. Other: _____</li> </ol> </li>   <li>2. Rate the following business environment factors based on importance to your decision to locate your business in Winneshiek County: 1 being "Not Very Important" to 10 being "Very Important".             <ol style="list-style-type: none"> <li>a. ___ Land/Rental Prices</li> <li>b. ___ Educated Workforce (Educational Attainment)</li> <li>c. ___ Skilled Worker Force (Technical Skills)</li> <li>d. ___ Central Location to your preferred market</li> <li>e. ___ Internet Connection and Service</li> <li>f. ___ Tax and business development incentives (tax incentives, capital improvement funds, etc.)</li> <li>g. ___ Other: _____</li> </ol> </li>   <li>3. Have you purchased internet service or intend to purchase internet service in the county?             <ol style="list-style-type: none"> <li>a. YES</li> <li>b. NO</li> </ol> </li>   <li>4. Will you be providing wireless (WiFi) to customers at your location?             <ol style="list-style-type: none"> <li>a. YES</li> <li>b. NO</li> </ol> </li>   <li>5. How much are you expecting to spend on internet services alone?             <ol style="list-style-type: none"> <li>a. _____</li> </ol> </li>   <li>6. What is the speed and capacity you are expecting for the price that you are willing to pay?             <ol style="list-style-type: none"> <li>a. _____ (Mbps) upload _____ (Mbps) download _____ (G) capacity</li> <li>b. Do you feel like you would benefit from higher internet speeds?                     <ol style="list-style-type: none"> <li>i. YES</li> <li>ii. NO</li> <li>iii. UNSURE</li> </ol> </li> <li>c. Why or why not?</li> </ol> </li> </ol>
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## Appendix 11 - Broadband Tracking Tools (Continued - 3)

<p>7. What skills do you expect all of your employees to possess? Mark all that apply:</p> <ul style="list-style-type: none"><li>a. Writing</li><li>b. Database entry and management</li><li>c. Critical thinking</li><li>d. Basic computer skills (word processing, internet research)</li><li>e. Communication</li><li>f. Oral presentations</li><li>g. Web design and management</li><li>h. Teamwork</li><li>i. Work ethic</li><li>j. Other: _____</li></ul> <p>8. Are you relocating employees from previous locations to this location?</p> <ul style="list-style-type: none"><li>a. YES</li><li>b. NO</li></ul> <p>9. Have you begun to hire employees from the area?</p> <ul style="list-style-type: none"><li>a. YES</li><li>b. NO</li></ul> <p>10. Do you intend on allowing employees telecommute?</p> <ul style="list-style-type: none"><li>k. YES</li><li>l. NO</li><li>m. Why or why not?</li></ul> <p>11. If yes, what percentage of employees would you allow to telecommute?</p> <ul style="list-style-type: none"><li>n. 0 to 100%</li></ul> <p>12. If yes, how many days a week would you allow employees to telecommute?</p> <ul style="list-style-type: none"><li>o. Less than 1 day</li><li>p. 1</li><li>q. 2</li><li>r. 3</li><li>s. 4</li><li>t. 5</li></ul>	<h3>Business Exit Survey</h3> <p>1. Which of the following factors contributed to the relocation of your business? (Mark all that apply.)</p> <ul style="list-style-type: none"><li>a. Costs associated with building/space rental</li><li>b. Taxes</li><li>c. Internet Services</li><li>d. Lack of employees with your preferred education level</li><li>e. Lack of technically skilled employees</li><li>f. Personal</li><li>g. Lack of market access (selling or buying of goods/services)</li><li>h. Other: _____</li></ul> <p>2. If "internet services" is marked, how did internet service play a role in your business decision to move or close? (Mark all that apply)</p> <ul style="list-style-type: none"><li>a. Cost of service</li><li>b. Lack of reliability</li><li>c. Service was not fast enough to accomplish work</li><li>d. Too many overage penalties</li><li>e. Did not have access</li><li>f. Other: _____</li></ul> <p>3. How satisfied were you with the speed and capacity of your internet?</p> <ul style="list-style-type: none"><li>a. Very Dissatisfied</li><li>b. Dissatisfied</li><li>c. Neutral</li><li>d. Satisfied</li><li>e. Very Satisfied</li></ul> <p>4. Did you incur data overage fees at least once per year?</p> <ul style="list-style-type: none"><li>a. YES</li><li>b. NO</li></ul>
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## Appendix 11 - Broadband Tracking Tools

5. How satisfied were you with the following internet factors? On a scale of 1 being "Very Dissatisfied" to 10 being "Very Satisfied". Please check one box per row.

Factor	Very Unsatisfied 1	2	3	4	Neutral 5	6	7	8	9	Very Satisfied 10
Internet Price										
Internet Speed										
Customer Service										
Other:										

6. What would have made your internet service experience better?

7. Did you allow any of your employees to telecommute for work purposes?

- a. YES
- b. NO

8. Why or why not?



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