



**IMU Board of Trustees of the  
Electric, Water and Communications Utilities  
July 18, 2016  
City Hall Conference Room  
5:30 p.m.**

**Agenda**

1. Call to Order
2. Roll Call
3. Public Comments
4. Consider Request from the Red, White and You Movement
5. Communications Utility Action Items
  - A. Accept Magellan Advisors Broadband Feasibility Report
  - B. Consider Magellan Advisors Proposal for a Business Plan, Implementation Plan and Network Design
  - C. Consider DA Davidson Placement Agent Engagement Letter
6. Other Business
7. Adjourn

**Meeting Date:** 07/18/2016

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**Information**

**Subject**

Consider Request from the Red, White and You Movement

**Information**

A group of Indianola high school students are looking to start a movement of unity and patriotism throughout the our community, state and nation. They have chosen to name this movement the "Red, White and You". Their mission is to inspire and encourage youth to participate in patriotic acts and attitudes.

This group of motivated students are hoping to kick start this movement by purchasing and installing a new 70 foot flag pole and 15x25 foot flag at the new football stadium. Their goal is to have it completely done before the first home football game this fall.

They are requesting a donation of equipment and labor to dig a 6x8 foot hole that is needed to support the structure. Mike Metcalf and Lou Elbert are recommending approval of the request, which is valued at approximately \$300 based on the utility's schedule of fees.

**Financial Impact**

N/A

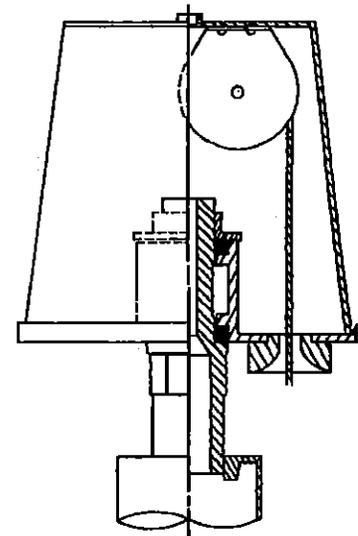
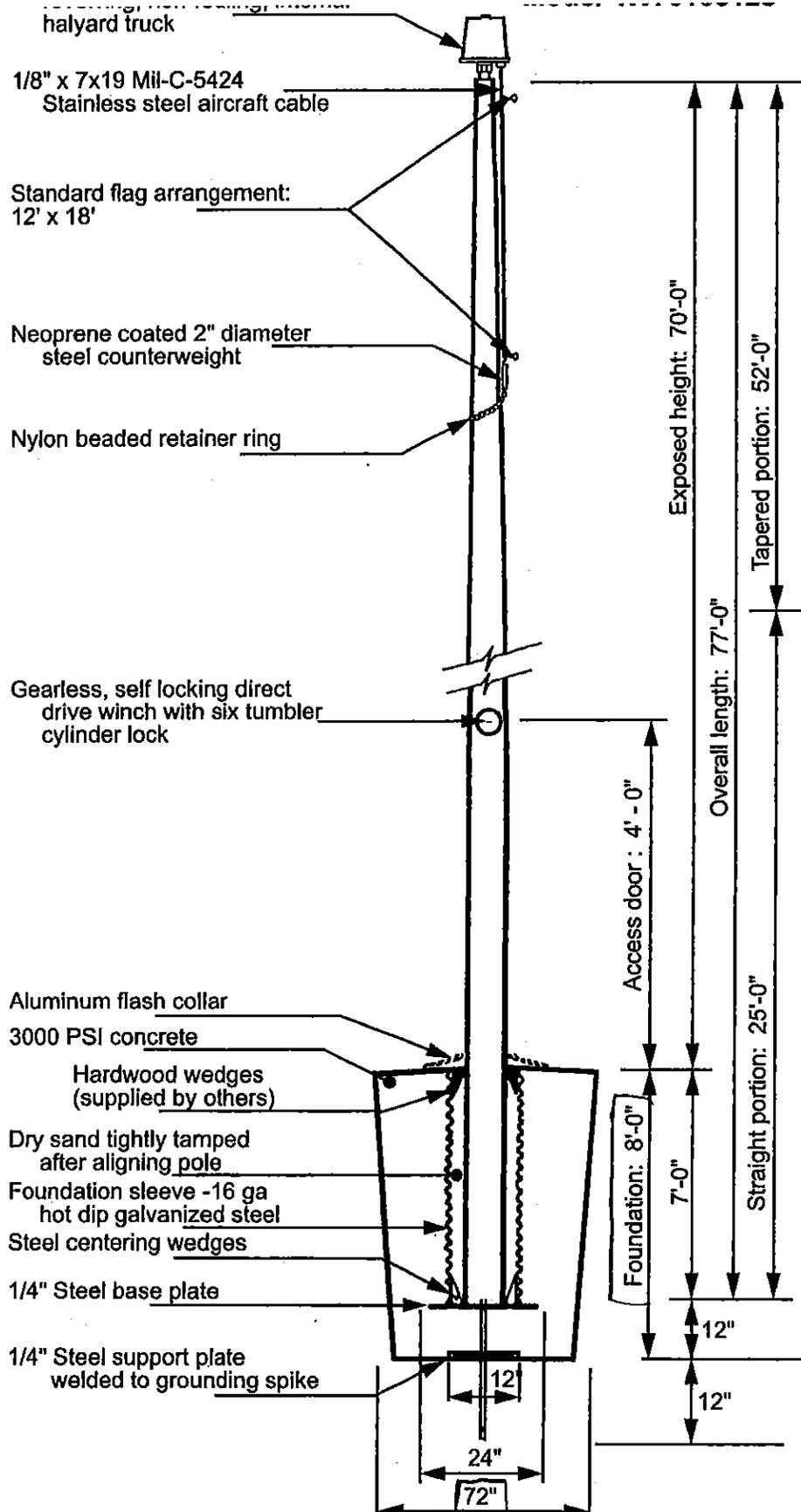
**Staff Recommendation**

Simple motion is in order.

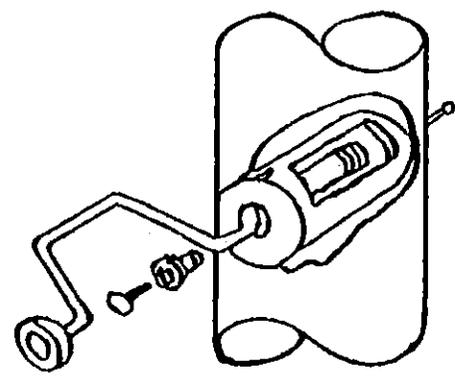
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**Attachments**

Flag Pole Schematic



Revolving non-fouling internal halyard truck, cast aluminum body, 26 stainless steel ball bearings, and 2-1/2" diameter plated steel sheave.

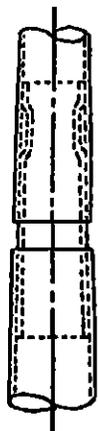


Winch Detail

All shafts with overall length of more than 38'-6" are shipped in two sections.

Each section matched marked for field assembly. Exposed portion of jam sleeve must be well lubricated prior to assembly.

1-1/2" maximum shop gap allowed for field fitting (ram for tight joint)



The Flagpole Company  
800.805.9728

Project:	Ground set tapered aluminum flagpole: ALLOY: 6063T6		Date:
Location:	Exposed height: 70'-0"	Overall height: 77'-0"	Revision:
Architect:	Ship in 1 section	Butt diameter: 10"	
Contractor:	Top diameter: 4"	Wall thickness: .312"	
Customer:	Finish: 100 grit polish		Job:

**Meeting Date:** 07/18/2016

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**Information**

**Subject**

Accept Magellan Advisors Broadband Feasibility Report

**Information**

Attached to this agenda item is the final draft of the broadband feasibility study from Magellan Advisors. Trustees tabled accepting this report at the June 27th meeting in order for Staff to confirm some of the data and to further investigate the business and implementation plan phase.

**Financial Impact**

N/A

**Staff Recommendation**

Simple motion is in order.

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**Attachments**

[IMU-FTTP Broadband Feasibility Report-FINAL](#)



# FTTP Feasibility Study Indianola Municipal Utilities

Prepared by: Magellan Advisors  
Released: July 5, 2016

**FINAL**



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## Executive Summary

"I would much rather get Internet service through my local municipal utility. I am not confident that with any commercial providers that we are getting fair pricing, and based on the test we are clearly not getting what we are paying for now. [Where we lived] at the time the utility began to provide cable, broadband and phone service and it was the best we have ever had--good value for what we paid and the blessing of having excellent local service."

"My kids need Internet for school and I run two businesses out of my home. My husband is working towards his master' degree and needs the Internet as well! Not having quality affordable Internet is a huge stressor."

"We need to evolve here in central Iowa ... to stay competitive for telecommuters and general small business."

"Please hurry up and do this as current providers are inadequate."

\* \* \* \* \*

Above are just a few of the nearly 175 comments garnered from the citizens and businesses of Indianola indicating their view of the state of the Internet in Indianola. The vast majority of comments received expressed the belief that broadband service in Indianola are severely lacking and desire that something be done quickly to address their concerns. In fact, 80% of residential survey respondents and 100% of business respondents said broadband should be considered a basic utility like electricity or water.

As Michael K. Powell, former chairman of the FCC, stated, "Broadband access is the great equalizer, leveling the playing field so that every willing and able person, no matter their station in life, has access to the information and tools necessary to achieve the American Dream". [1] This quote stresses that the future of our communities is determined increasingly on their "connectivity" to the digital world. Broadband superhighways have become a critical factor in measuring our capabilities to succeed in the new world economy. Infrastructure that enables these superhighways is essential, enabling businesses, residents and local governments to connect with one another. In smaller communities, broadband services have generally lagged behind those found in larger metropolitan areas of the country, a concept often referred to as the geographic "Digital Divide." In metropolitan telecommunications markets, many providers have upgraded their infrastructure to provide fiber-optic access to businesses and residents. The large demand per square mile in these areas allows them to justify the cost of upgrading to a fiber-optic infrastructure.

Lamentably, for smaller markets such as the market served by Indianola Municipal Utility (heretofore known as "IMU"), national service providers struggle to justify the capital investments necessary to upgrade their infrastructure due to the lower overall demand and

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[1] Michael K. Powell, former Chairman of the Federal Communications Commission (FCC)

lower population density. As a result, smaller markets are “left behind” as the metropolitan areas progress and receive the latest broadband technologies, speeds, and related services. Smaller markets are forced to continue to operate on current provider’s technologies that are often limited in speed and overall upgradeability. This limits the community’s overall access to next generation high-speed broadband services and has an adverse impact on the prices they pay for, what is today, inadequate services. For these reasons, local governments, public utilities, and cooperatives have stepped in across the country to enhance broadband services, themselves, for their residents and businesses. Commonly referred to as municipal/utility broadband, organizations that serve the public interest have been implementing state-of-the-art fiber broadband networks in order to bring required capacity and services to their communities. In doing so, they level the playing field for their residents and businesses, allowing their communities to compete in the world digital economy.

Regrettably, based on the results of this Study, Indianola’s current providers have severely limited their network and service expansions and upgrades leaving the community with the lack of a community-wide, stable, high-speed broadband infrastructure, such as fiber-optics. This represents a significant issue for the Indianola market. Without available stable, cost effective broadband capacity, intrinsic to fiber-optic networks, Indianola’s businesses and residents will always encounter the bottleneck of the older technologies (e.g. DSL, copper-based) used by two of the three existing service providers. Cable and DSL connections usually provide asymmetrical (i.e. upload speeds are significantly lower than the download speed) bandwidth that maxes out around 50 Mbps in Indianola, however, in the majority of Indianola, attainable bandwidth speeds are usually significantly lower, in the range of 3-15 Mbps or less. This bandwidth speed is well below what the FCC states as the minimum bandwidth speed (25 Mbps) necessary to qualify as a broadband service. However, many, if not all, communities who have installed a fiber-optics platform are offering symmetrical services (i.e. both download and upload speeds are the same) in access of 100 Mbps and in most cases are offering 1 Gbps service. 1 Gbps is almost 70 times faster than the Indianola’s prevailing services. As an example, the time it would take to download a full-length HD movie at 15 Mbps would be approximately 25 minutes, as compared to 1 Gbps where the download would take approximately 22 seconds!

In addition to the bandwidth/speed differences, Cable and DSL are shared bandwidth technologies that cannot consistently provide the guaranteed quality, reliability, or performance that fiber-optic infrastructure provides. If you take a close look at advertised Internet cable provider packages, you will see that speeds are qualified as “up to” to take into consideration the likelihood that speeds will not be attainable all the time. In contrast, fiber-optic technologies provide dedicated capacity at much greater bandwidths. In addition, bandwidth speeds for fiber based networks continue to increase (e.g. 10 Gbps is being deployed in several markets) as new electronics are developed allowing for rapid increases in bandwidth without any enhancements to the physical fiber network.

Even though the majority of Indianola is served by copper-based providers, it must be noted that there is one fiber-based provider, Mahaska Communications Group (“MCG”) that serves a small section in east Indianola through a wholesale relationship with IMU. MCG

compensates IMU \$30/mo. for each resident connected by MCG and \$100/mo. for each business. MCG, overall, has a satisfied customer base, and currently offers higher bandwidth speeds than the other providers. Nevertheless, MCG has only achieved a penetration rate of currently around 21% within the current fiber service area (+/- 25% of the City), and has no current plans to expand further into Indianola unless supported by IMU. They desire to keep the current business arrangement, in that, they want IMU to build out the fiber network to the other areas of Indianola, and they in turn, would continue to pay IMU the \$30/\$100 per connected resident/business. MCG may be open to adjusting fees, however, the current fees would need to more than double for residents and approximately 35% for businesses to generate a cumulative positive cash flow within seven years. We do not believe this would be a viable model for MCG going forward.

As part of the Study, Magellan ran several financial analyses using the costs to build out and maintain the network throughout Indianola against various penetration (uptake) rates (25%; 40%; 55%; 70%), in which the starting penetration rate is higher than MCG's current uptake. The analyses determined that at the current wholesale rates, 25%, 40%, and 55% penetrations never achieve a positive cash flow over 20 years and produce cumulative cash flow losses of \$16.7M, \$10.8M, and \$5.0M, respectively. Even if 100% of possible resident and businesses were connected, the model does not achieve a positive cash flow until the seventh year. In order to achieve a positive cash flow within 5 years with a conservative penetration rate of 40%, the wholesale rate would need to at least double for residents and increase by over 30% for businesses. At these increased rates, it may effect MCG's ability to continue under a wholesale model.

For further evidence of the community's discontent with the current broadband environment, the vast majority of residents and businesses responding to the survey believe that reliable, high-speed Internet is an essential service on the same level as electricity and water and that they could not live without it or believe it is a very high priority. However, with this strong belief in the critical need for stable high-speed broadband, for the residential and business communities served by cable or DSL, two-thirds state that their current provider does not meet their needs, 60.7% experience frequent moderate to total service disruptions, and current service overall is unacceptable.

Outside of dissatisfaction issues, quality Internet has now become a key element in a community's Economic Development plan. Both residents and businesses feel that having quality Internet services is key in remaining or locating their homes or businesses into the Indianola community. Businesses were very clear, in that, 69% stated that quality Internet is extremely or very important for their ability to remain or expand in Indianola. Even for residents, where the decision to locate to a community has many additional factors, almost 50% indicated that Internet services is a key decision factor.

Taking into consideration all of the factors addressed in this Study, Magellan's recommends IMU expand the current FTTH network to the entire Indianola community under a retail provider (FTTH) business model. The network will become (a) a critical asset for long-term

economic development in the community; (b) keep revenues in the local economy versus sending dollars outside of Indianola; and (c) can quickly surpass the existing broadband infrastructure to deliver reliable, high-speed, broadband services.

## Project Background

In early 2016, Indianola Municipal Utility retained Magellan Advisors to conduct a FTTP Feasibility Study to assess Indianola Municipal Utility's opportunities to provide broadband services to its citizens, businesses, and community anchor institutions. Over the past months, Magellan Advisors has assisted IMU through the strategic planning process, which has included the following:

- Analysis of IMU's current market for broadband Internet and voice over IP ("VoIP") services;
- A comprehensive needs assessment for the community, including quantitative research that was conducted by Magellan to determine current demand;
- Interviews with community stakeholders;
- A high-level network engineering design for the IMU's potential broadband network that would serve the community;
- An analysis of multiple business models that IMU could utilize to provide Internet, VoIP and other complimentary services;
- A next-steps action plan to determine if IMU should proceed to formal business, financial, and implementation planning.

## Purpose and Objectives

IMU wishes to construct utility-owned fiber-optic facilities to support a next-generation broadband infrastructure needed to meet the technological and service requirements of current and future businesses, educational institutions, other community anchor institutions, as well as the citizens of Indianola. IMU appropriately views a state-of-the-art broadband infrastructure as a key to future economic and community development. Broadband infrastructure is defined as the integration of multiple components such as (1) physical fiber cabling and electronics that connect premises, (2) interconnection to the "world-wide web", and (3) people and support assets necessary to operate the broadband network.

In order to achieve this goal, IMU desires to have a comprehensive Fiber-to-the-Premise (FTTP) Feasibility Study to use as the basis for development of FTTP broadband business model options and strategies. Along with business options and strategies, the Study will also include initial network layout topology, estimated construction costs, recommended services, and financial projections based on various business models, subscriber/business capture rates ("uptake") and service pricing.

Finally, the Study will present “best fit” recommendations to IMU based on Study findings in correlation to IMU’s defined goals and objectives.

## Study Topics and Process

Magellan Advisors has used a variety of techniques and resources to address the various Study areas including, but not limited to, the following:

- Current Indianola market encompassing:
  - Indianola census data garnered from data and reports supplied by IMU,
  - Current market demographics,
  - Current service providers from community research and FCC 477 data,
  - Assessment of data gathered from residential and business surveys,
  - Community stakeholder interviews to assess needs and requirements for a widely accepted broadband network, and
  - Services offered and competitive price points
- Mapping of current fiber network provided by IMU
- Mapping of additional fiber network routes and components to provide coverage to the entire Indianola service area.
- Financial modeling of various business models and scenarios using Magellan Advisor’s proprietary modeling software.
- Operational needs (e.g. staffing, equipment, overheads, etc.) based on knowledge and experience from designing and implementing broadband entities across the United States including many projects involving municipal utilities.

# Findings of the FTTP Feasibility Study

## A. Overview

This study has determined that expansion of a city-wide fiber-optic network is an important asset that can be used to deliver high-speed Internet, VoIP, video, and state-of-the-art cloud-based services to all of the Indianola service area. Based on analysis of IMU's broadband telecommunications market, the area lacks critical area-wide broadband as currently defined by the FCC as being able to deliver 25Mbps download and 3Mbps upload data streams. Much of the existing infrastructure owned and operated by incumbent telecommunications providers is based on technologies that deliver services over copper-based networks to businesses and residents within the Indianola area. The majority of services are based on either cable or DSL facilities with incumbents providing both business and residential services on their current platforms. Although some broadband exists in the community, it is mainly limited to a few direct cable connected businesses and to an IMU fiber-optic infrastructure in east Indianola utilized by only one service provider, Mahaska Communication Group ("MCG") with below industry penetration rates and no current plan to expand into other areas within Indianola.

Per the Study, Magellan has concluded that offering Fiber-To-The-Premise (FTTP) broadband services including Internet, VoIP, and possibly video, provides the most significant business opportunity and community benefit for IMU based on the following factors:

- Community needs assessment favoring a municipal broadband provider, across residential, business and community anchor customers;
- Quantitative market research identifying specific needs in the community that create a strong opportunity for IMU;
- Lack of performance and limited high-speed broadband coverage of current providers in the current City of Indianola market; and
- Desire of IMU to provide broadband services to the entire community.

Several key competitive advantages (e.g. "home town" provider, customer support expertise) provide strong market opportunity and great community benefit to Indianola. This opportunity is not without risks, and significant planning of activities will need to be accomplished before IMU fully engages as an FTTP provider. The Study provides a comprehensive analysis of the prospective IMU communications utility that would provide high-speed broadband related services to residents, businesses, and community anchor organizations.

The following sections identify the overall findings of the Study. Areas covered include community benefits, market research, current area provider summaries, business model options and recommendation, revenue model, cost structures, and financial overview. We also provide our professional recommendation of the best options based on our understanding of the current desires and risk-reward tolerance as it pertains to IMU.

## B. What Benefits Would the Community Receive?

Municipal/Utility broadband utilities directly benefit their communities because they are locally-owned and operated, focused on delivering the greatest value at the least cost, and structured to continually invest and improve services for the community. Municipal/Utility broadband providers differ from traditional providers in that they can, and must, differentiate their services on the following key aspects:

- Understanding customer needs;
- Responding to customer needs;
- Providing superior customer support; and,
- Ensuring customer satisfaction

The first aspect, “Understanding customer needs”, is a critical component of service delivery for IMU. As a key stakeholder in the community, IMU is able to more closely understand the wants and needs of the Indianola area. Through this Study, it has been determined that Indianola’s top requirements for broadband Internet services to the community encompasses:

- Better access to reliable, high-speed Internet services for residents, businesses, and community anchor institutions (“CAIs”);
- A higher degree of price performance in the offered services in comparison to current providers;
- Delivering services “as promised”. On time and error-free.
- More competent and consumer friendly support.

IMU’s broadband utility needs to focus on addressing these requirements in order to capture and maintain consumers while competing head-to-head with established Internet providers. The benefits to the community will be directly tied to how successfully IMU executes its plan for the broadband utility. When successful, the community will achieve the following benefits:

- Superior Services and Long-Term Sustainability  
IMU’s greatest opportunity is to build a Fiber-To-The-Premise network that will provide an immediate and significant improvement in current services to the Indianola community. Not only will the fiber-based network close the gaps in current service quality, but it will also provide a platform for long-term growth and scalability to meet Indianola’s future needs.
- Superior Customer Service and Support  
IMU’s customer service will provide pro-active, responsive customer support in the community (e.g. notifying customers when outages occur and providing quick response times to restore services). Because the system is locally owned and operated, IMU can provide immediate response for issues impacting a segment of customers or the entire

system, same-day and next-day response for repairs and maintenance of residential and business customers, as well as immediate dispatch for critical customers such as schools, hospitals, and other critical facilities.

- Service Packages that Reflect Customer’s Preferences

IMU understands its customers and can tailor service packages to meet their preferences. Where traditional providers create packages based on nationwide or region-wide assessments and maximizing profit, IMU will create its packages specifically based on the Indianola community’s preferences rather than to the region. This will give IMU a competitive advantage in the market, providing the strongest value proposition to customers and ensuring that they receive the value for the dollars spent on their services.

- Long-term Pricing Stability

Due to several factors (e.g. current customer support personnel can address both utility and Internet issues), IMU can exercise control over costs more efficiently than their competitors. Controlling costs subsequently allows IMU to better control pricing that Indianola consumers will pay for services. Although price increases will be required in the future, IMU can better minimize impact to customers than its competitors. This will help IMU provide long-term customer satisfaction, and in turn, reduce costly churn in its customer base.

- Integrative Opportunities

IMU’s broadband network should become a community resource that is used to expand state-of-the-art services to the community, outside of the standard provision of broadband services. Communities that have built networks similar to the proposed IMU network have found innovative ways to use the network platform for additional benefits to the transportation, electric, water, and waste water sectors. Using the network platform for adjunct service allows IMU to provide better services at lower costs. The network should be positioned to maximize community benefit for homeowners and businesses and additional uses should be constantly researched for potential benefit to IMU and its inhabitants. Examples of applications being used in other communities today include providing smart home automation, and community alert systems just to list a few.

## **C. What Benefits Would IMU Receive?**

With a high-speed fiber-optic network connecting consumers throughout Indianola, IMU can use this technology to build out its “Smart Grid” capabilities. Smart Grids enable IMU to interact with their customer’s power needs near real-time to allow automated load shedding, price signaling (e.g. time-of-use pricing), and other cost saving activities.

Connectivity to the consumer is accomplished through an Advance Metering Infrastructure (“AMI”) system which measures, collects and analyzes energy usage from advanced devices

(e.g. “Smart” electrical meters, hot water heaters, smart A/C units, etc.) through optical fiber communication on request or a pre-defined schedule.

The other key to use of a fully functional smart grid, is having sufficient bandwidth throughout the network so that data collection from meters is not interrupted by data traffic bottlenecks due to Internet traffic. Employing a 1Gbps fiber network solves this issue.

Additional benefits to IMU would include fewer outages due to improved distribution management and intelligent switch technologies. EPB, in Chattanooga, TN, estimates that their Smart Grid has reduced outages by almost 40%.

Another asset that a fiber-optic based system gives to IMU is the ease-of-scalability for the newer and future electrical based applications such as smart thermostats, premise based load control devices, distribution and smart appliances.

All of these gives IMU the ability to enhance the customer experience while reducing the delivery price points.

## **D. Economic Development**

***“The message to policymakers is clear: If you want to increase economic growth, focus on broadband.”*** -Robert Pepper, Vice President of Global Technology Policy at Cisco

The need for reliable, high-speed broadband in Indianola, was brought out during stakeholder interviews, where we heard a number of stories from local businesses outlining Internet issues impacting their economic viability and stability. One local business owner stated that he would not have made his home in Indianola had he known at the time how far behind the curve the city was in providing quality Internet services. He stressed that poor Internet affects those who telecommute and/or have businesses out of their home a great deal. So much so that he simply decides to drive to Des Moines each day so that he can be more efficient and have good Internet service.”

Through numerous studies on the impact of fiber-based networks on local economies, the Institute for Self-Reliance issued this key statement, “When a community invests in a municipal fiber broadband network, it often does so because it hopes to reap economic benefits from the network. Many people and organizations have explored the positive relationship between municipal Internet networks and economic development, including a White House report published in January 2015. Municipal-based networks create jobs by ensuring businesses have fast, affordable, and reliable Internet access; the old DSL and cable networks just don't cut it. Fiber networks improve the productivity of existing businesses and attract new businesses to communities, allow individuals to work from home more effectively, support advanced healthcare and security systems, strengthen local housing markets, and represent long term social investments in the form of better-connected schools and libraries. They also create millions of dollars in savings that can be reinvested into local economies.”

Following are just a few of the large number of real examples of where bringing in fiber-based networks have had significant impact on the local economy.

### **Job Creation**

**“You can't grow jobs with slow Internet.”** - Stephanie Rawlings-Blake, Mayor of Baltimore

In Morristown, TN in 2013, Oddello Industries, brought 228 jobs to the community after investing in a \$4.4 million site expansion in Morristown. More recently, a call center planned to relocate to Morristown due to the municipal utility's fiber network. Morristown offered to install the fiber for free because it valued the future economic benefits the call center would bring to the city over the cost of the fiber installation. For Chanute, KS, having a fiber-based network was instrumental in attracting Spirit Aerosystems to open up a new manufacturing facility creating 150 jobs that require high quality broadband Internet. Defense contractor Northrup Grumman and IT consultant company CGI chose Lebanon, VA for its high-speed fiber network with the goal of creating 700 jobs paying twice the median wage.

### **Attract New Business**

**"... companies want to go where they can see the gig service."** - Marshall Ramsey, President of the Morristown, Tennessee Chamber of Commerce

Expedia, the online travel giant, created hundreds of jobs in Springfield, MO in the form of a call center that relies heavily on the high bandwidth of Springfield's municipal network. Pixel Magic, a visual effects producer, and Tapes Again, a media reproduction and processing company, both located offices to Lafayette, LA to gain access to the municipally-owned LUS Fiber in order to support the state's burgeoning film industry. Another example is in Cedar Falls, IA where its industrial park went from having 27 businesses and \$5 million in taxable valuation to having 160 businesses and \$270 million in valuation in the twenty years since it connected to the municipal fiber network.

### **Keep Critical Jobs in Town**

**"Municipal broadband can be a powerful lever against the digital divide that condemns people to the isolation and reduced economic opportunities experienced by many ..."** - Seattle City Councilmember

The small Minnesota town of Windom was in crisis when Fortune Trucking, a local company that employed 47 people in a town of 4,600, announced that slow Internet speeds might force it to leave town. Although the company's headquarters were located a mile outside of the Windom's jurisdiction, community members successfully lobbied to bring municipal fiber to Fortune Trucking, saving jobs and stabilizing the local economy. Alpha Natural Resources, a coal mining company, stayed in Bristol, VA, thanks to the BVU municipal fiber network. Also, when the city of Princeton, Illinois set up a municipal broadband network, it kept 300 jobs in the community with the global industrial machinery company, Ingersoll Rand.

### *Advance Healthcare, Education, and Research*

**“We are embarking on new initiatives with our local school district and regional colleges and universities to leverage broadband and to facilitate discussion between schools and the business community to strengthen, retain and attract quality workforce.”** - Dana McDaniel, Deputy City Manager of Dublin, Ohio

In Danville, VA, their municipal broadband has long served the Danville Regional Medical Center, one of IMU’s largest employers. Medical companies Ohio Health and Cardinal Health; Battelle Memorial Institute, a non-profit that relies on quantum computing to encrypt information; and numerous educational facilities use Dublin, OH municipally-owned fiber network for their healthcare, education and research needs. Lakeland, FL invested in a dark fiber community infrastructure, and has since reaped the rewards; the Florida Polytechnic University and Lakeland Regional Health medical center. Both rely on the network for their critical operations.

### *Home Based Businesses and Telecommuting*

**“There is even broader belief that using broadband to make home-based entrepreneurs a major economic development force, with 52% of respondents saying this is a likely outcome and another 25% who have had personal experience in this area.”** - International Economic Development Council

According to HR Daily Advisor in 2015, telecommuting continues to grow year after year. In fact, some analysts predict that 30 percent of workers in industrialized countries will be telecommuting within just a few years. It’s already higher than that in some industries and regions. When allowing telecommuting, employers benefit by saving money and by increasing productivity. The benefits of working from home are plentiful, but telecommuters need high quality next generation broadband in order to take full advantage of this arrangement.

In 2010, DirecTV announced the creation of a virtual call center, allowing 100 residents in southwestern Virginia to work from home, relying solely upon municipal broadband access. 150 home-based English teachers in Powell, WY were connected to students in South Korea by the Korean venture capital firm, Skylake Incuvest; this unorthodox pairing was made possible by Powell’s investment in FTTH. Policymakers in Ashland, OR, use the city’s fiber network, Ashland Fiber Net, to incentivize and support Internet-based home businesses.

### *Initiate Tech Booms and Incubate Start-Ups*

**“...fiber-optic backbone ... gives hundreds of startups like RareWire a chance to compete on a bigger field. ‘It’s made the city and entrepreneurs realize there’s a great opportunity in front of them,’** says Kirk Hasenzahl, RareWire’s cofounder and president.” – Alex Knapp, Forbes

Multiple tech companies have moved to Lafayette, LA, creating thousands of jobs and rebranding the city the “Silicon Bayou.” Mesa, AZ, which has long been on the cutting edge in terms of laying city-wide fiber conduit and providing firms next-generation infrastructure, will

be the new site of a \$2 billion Apple global command center. The City of Dublin, OH, is home to the Dublin Entrepreneurial Center, a combination start-up incubator and data center located in the city's metro center offices that now lists more than 80 tenants.

### **Save Money to Reinvest in Local Economies**

**“In terms of fiber-enabled cost savings, 120 businesses in Bristol reported an average of \$2,951 in savings per year, while, in Reedsburg, 33 cited annual cost savings averaging \$20,682. Twenty Jackson businesses reported cost impacts due to fiber, with one large organization reporting a total of \$3 million in savings.”** – Institute for Local Self-Reliance

Ponca City, OK residents have saved nearly \$4 million a year in avoided ISP costs since the community switched to a municipal fiber network. In the town of Spanish Fork, UT, a municipal network is responsible for community savings of \$2 million annually, as well as local government revenues exceeding \$1 million, which can be used for community projects and initiatives. Also, Howard County, MD, has seen significant public savings (of up to \$3 million a year) which it has reinvested in impressive technological advances in its school system since switching to municipal broadband services.

### **Home Values**

**“As more research on housing prices and home Internet access surfaces, the value of FTTH deployments appears to be on the rise. A 2014 study by the consulting firm RVA LLC revealed a \$5,250 increase in the value of a \$300,000 home. Now, according to the newest study, a similar increase in value can be seen in homes worth half this amount.”** – Fiber-to-the-Home Americas

Housing prices increased by 50 percent in one year when Google decided to locate a data center in The Dalles, OR on account of its advanced technological infrastructure and high-speed municipal broadband access. A study by the Fiber-To-The-Home Council Americas in conjunction with researchers from the University of Colorado, showed that single family homes that can boast a FTTH connection are worth, on average, 3.1 percent more than their fiberless counterparts.

As the testimonials above depict, a high-speed fiber-based network is a critical component to growth and maintenance of local economies in the Digital Age. IMU must meet the challenge to brand and market the network properly to ensure that its benefits are understood to prospective (and current) businesses and residents.

## **E. Current Market Overview**

A variety of companies provide broadband infrastructure in the retail markets in the greater Indianola area. Magellan used a multiple step process to track and verify provider services and coverage area. The Study looked at the provider's published rates for the Indianola area. However, Magellan has found that the published speeds and rates are not always available to

all consumers in the designated area due to provider’s network not extending throughout the entire area or existing network equipment is saturated and no more consumers can be serviced. With this in mind, Magellan identifies 10-15 addresses throughout Indianola in an attempt to verify if providers are truly offering services as advertised.

Details for each main provider are provided below.

**Mahaska Communications Group (MCG)** Mahaska Communication Group offers internet service within the state of Iowa. Fiber-optic internet from Mahaska Communication Group is available to an estimated 10,000 people. In addition to fiber broadband, Mahaska Communication Group also offers fixed wireless internet service. Its fixed wireless service is available to approximately 3,000 people.

*Figure 1: MCG Residential Published Rates for Indianola*

Packages	Download/Upload Speed	Monthly Fee	Other Fees
Basic Internet	25 x 25 Mbps	\$40.00	\$6/month for wireless router
Premiere Internet	1 x 1 Gbps	\$70.00	\$6/month for wireless router
Basic Double Play (Internet and Local Calling)	25 x 25 Mbps	\$50.00	\$25/month for unlimited LD; \$6/month for wireless router
Premiere Double Play (Internet and Local Calling)	1 x 1 Gbps	\$80.00	\$25/month for unlimited LD; \$6/month for wireless router
Basic Triple Play (Internet and Local Calling)	25 x 25 Mbps	\$109.00	\$25/month for unlimited LD; \$6/month for wireless router
Premiere Triple Play (Internet and Local Calling)	1 x 1 Gbps	\$139.00	\$25/month for unlimited LD; \$6/month for wireless router

*Figure 2: MCG Business Published Rates for Indianola*

Internet/Phone Packages	Download/Upload Speed	Monthly Fee	Other Fees
Internet 10M	10 x 10 Mbps	\$70.00	Equip extra (quoted price)
Internet 25M	25 x 25 Mbps	\$150.00	Equip extra (quoted price)
Internet 100M	100 x 100 Mbps	\$250.00	Equip extra (quoted price)
Internet 1G	1 x 1 Gbps	\$500.00	Equip extra (quoted price)
Business Phone (per line)	N/A	\$20.00	LD is per minute

**CenturyLink** is the incumbent local exchange provider holding certification from the Iowa Public Service Commission. As the incumbent LEC, CenturyLink provides DSL Internet, voice, and video retail services to residential and business consumers and wholesale services to other telecommunications providers.

Figure 3: Century Link Residential Internet Published Rates for Indianola

Internet Packages*	Download Speed	Monthly Fee	Current Promotions	Prerequisites	Other Fees
High-Speed Internet 12 Mbps	"up to" 12 Mbps	\$19.95	Price guaranteed for 36 months	Must have telephone service with Nationwide calling - \$49/month	Wireless router \$9.99/month
Pure Broadband	"up to" 40 Mbps	\$29.95	Price guaranteed for 12 months with 2-year term agreement		Wireless router \$9.99/month

\* Speeds are not guaranteed

Figure 4: Century Link Business Internet Published Rates for Indianola

Internet Packages*	Download Speed**	Monthly Fee	Current Promotions	Includes	Other Fees
Business and Website Service	"up to" 10 Mbps	\$74.99	With 2-year term agreement	Web hosting	Wireless router \$9.99/month

\* Speeds are not guaranteed

\*\* CenturyLink publishes speeds of 100 Mbps and 1 Gbps, but are not currently available in Indianola

**Mediacom**, a cable television company, provides Internet, phone, and digital cable TV services using cable DOCSIS 3.x technology. The company also offers business Internet, business phone, managed voice solutions, business TV and music, mobile data, and Web hosting for small businesses. It serves customers in government, education, healthcare, finance, and hospitality industries. Mediacom is based in Mediacom Park, New York, and as of 2015, serves approximately 7 million customers in 21 states.

Figure 5: Mediacom Residential Internet Published Rates for Indianola

Services*	Down /Up Speed*	Monthly	Current Promotions	Other Fees
Prime Internet (New Customer)	15 x 5 Mbps	\$49.95	\$34.95 Price guaranteed for 1 year with 2-year term	Installation - \$49.99 Activation Fee - \$10.00 Monthly Modem Rental - \$7.50 Data Charge (over 250 Gb) - \$10 / 50 Gb
Digital Phone		\$19.95	\$9.95 Price guaranteed for 1 year	Installation - \$9.95 Monthly EMTA Modem Rental - \$5.00

\* Speeds are not guaranteed

Mediacom also offers business services in standard packages or in an Individual Case Basis (ICB). The confirmed business packages were:

Figure 6: Mediacom Business Packages for Indianola Area

Services*	Down/Up Speed**	Monthly	Term	Other Fees
Internet PLUS	10 x 1 Mbps	\$69.95	Price guaranteed with 3-year term agreement	Installation - \$99.95 1 Phone line - additional \$20 2 Phone lines - additional \$50 3 Phone lines - additional \$80 4 Phone lines - additional \$110 Customer responsible for all needed equipment
Internet ULTRA	20 x 2 Mbps	\$129.95	Price guaranteed with 3-year term agreement	Installation - \$99.95 Customer responsible for all needed equipment
Internet PRIME	20 x 20 Mbps	\$299.95	Price guaranteed with 3-year term agreement	Installation - \$99.95 Customer responsible for all needed equipment

\* Mediacom advertises 50 and 105 Mbps Internet, but not currently available in Indianola

\*\* Speeds are not guaranteed

## F. Community Survey and Community Stakeholder Responses

Magellan Advisors conducted quantitative research through the use of in-person community stakeholder meetings and online surveys to gather data regarding their broadband uses, needs, and satisfaction with current providers. Detailed results of this survey can be found in Appendices B (business) and C (residential).

27 businesses and 369 residents responded to the survey. These responses were beneficial and provided important input for the FTTP Feasibility Study. The sections below provide a summary of the results of the business and residential surveys.

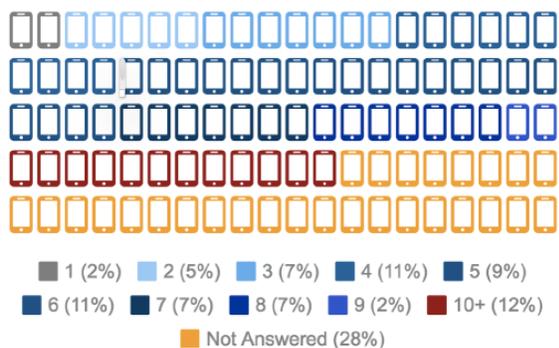
### Residents Survey Responses

According to the Residential Survey, the vast majority (95%) of homes in the Indianola area have some type of Internet service in the home. Of those not having Internet service, their main reasons were high prices, slow speeds, or not available in their area. Most believe that reliable, high-speed Internet is an essential service on the same level as electricity and water (81%), with a high percentage (77%) saying they could not live without it or believe it is a high priority.

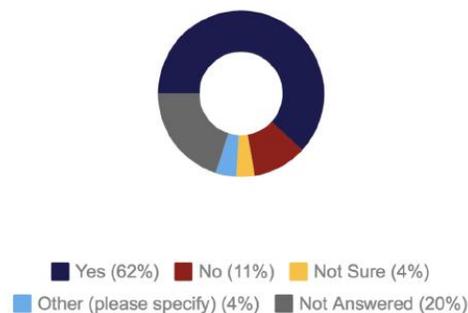
The majority (64%) of consumers subscribe to DSL and cable platforms, while wireless, fixed wireless, and satellite Internet comprise about a quarter of the premise connections (28%). Fiber access is available in only a select area and has limited penetration (5%). The remainder are either using dial-up or are unsure of what platform they have.

In the Indianola area, for residents responding to the survey, there is a significant dependence on the Internet for their job or for home-based businesses (43%). In correlation with the dependence on the Internet for job-related functions, there is rising dependence for access to high-speed networks for residential devices. The majority of respondents' homes currently has five to nine devices accessing the Internet (50%), whereas almost one-fifth (17%) of homes have 10+ devices.

How many devices do you have in your home that connect to the Internet?



Do you consider high-speed Internet an essential service as water and electricity is today?



### Rating of Internet Service



As the use of the Internet continues to increase in the residential sector, the majority of respondents find that the current Internet environment in Indianola is not meeting their current, let alone future, needs (48%), mainly due to price paid for inadequate speeds and reliability. Another (15%) were unsure if their needs were being met. In fact, not one provider listed in the survey scored a rating of “very good” or “excellent”. Most were rated “fair” at best and for some services were rated as “poor”.

When asked how important having high-speed access is in a decision to locate or remain in a community, nearly half (49%) said it was extremely or very important, while most of the remainder (45%) believe it was somewhat or moderately important.

Prices paid for services is somewhat difficult to clearly quantify due to different offerings consisting of various speeds or packaging of one to three services (Internet, voice, video). However, almost three-fifths of the respondents (58%) stated that they pay for Internet service separately. The three most often quoted price ranges paid for services each encompass about a two-thirds of the responses. \$30.00-\$49.99 (24%); \$50.00-\$74.99 (32%); and \$75.00-\$124.99 (21%).

Lastly, below are a few of the actual 167 comments received that give personal testimonials to the state of Internet in Indianola from the residents’ perspective. See the full set of comments in the Residential Survey Appendix.

- "I am a new resident to Indianola and did not realize internet service was so terrible where I purchased my home.”
- “I need my service to work. Busy people don't have time for shut downs, dropped service and slow speeds.”
- "I recently toured The Village. I won't move there because they have Mediacom."
- "Indianola seems to be lagging behind much of the world in internet options and speed. Can't interact with internet the way I would like. Big downloads take too long, upload next to impossible, hard to use online applications that are desktop replacements."

Another key sentiment was expressed by several respondents.

- "I would much rather give money to a local internet company than a big conglomerate."

## Business Survey Responses

Business response was weaker than the residential survey, however, one could still obtain good feedback regarding the business landscape in Indianola.

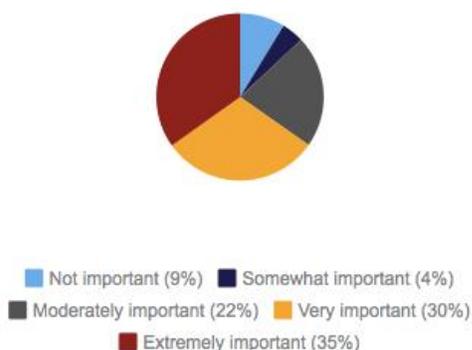
All businesses (100%) who took the survey have some type of Internet service. Also, (91%) believe that reliable, high-speed Internet is an essential service on the same level as electricity and water.

The breakdown of businesses responding to the survey consisted of small businesses with 25 or fewer employees (79%); mid to large businesses having 25 - 100 employees (15%). There were two respondents that had 100+ employees. The top business segments were Finance and Insurance (24%), Retail (9%), Educational Services (9%), and Construction and Professional Services, both at (9%).

Nearly half (47%) of businesses use DSL or cable platforms. Wireless, fixed wireless, and satellite Internet comprise about one-sixth (18%) of business connections. Fiber access (34%) was obtained through direct contracts with various fiber providers, usually at high installation costs. The remainder are unsure of what platform they have or have some other type of service.

Most importantly, a high percentage (79%) of respondents with cable or DSL platforms find that current business Internet services are not meeting their needs and that most (71%) experience moderate to severe service disruptions on a regular basis. As with residents, businesses did not rank even one provider with a rating of “very good” or “excellent”. Services components such as reliability, availability of services, and support only rated “good”, while speed and prices was rated as “fair”.

When relocating, how important is fiber-based high speed internet?



Almost all (87%) of respondents held that it is important having high-speed access when making a decision to locate or remain in a community and that most (61%) believe having multiple choices for reliable service providers is very or extremely important.

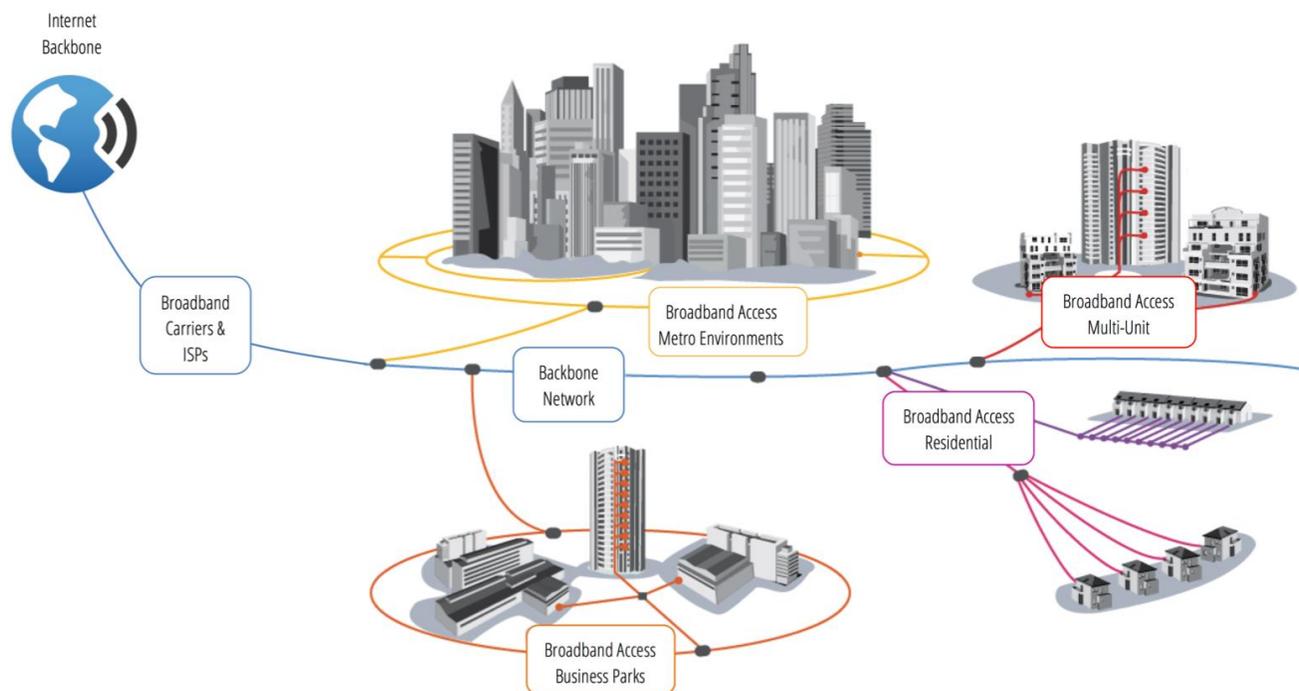
In terms of pricing of services, most providers build offerings and pricing plans on an individual customer basis, unless it is a small business needing lower end services. This is shown by the top three quoted price ranges: \$50.00-\$99.99 (25%); \$100.00-1494.99 (19%); and \$300+ (16%).

# Infrastructure Options Overview

## A. Infrastructure Options

Broadband is deployed throughout communities as wired and wireless infrastructures that carry digital signals between end users and the content they want to access. The content comes in many forms and from many locations across the world in the networks that connect the local community to the Internet backbone. Websites, television, streaming video, videoconferencing, cloud services, and even telephone service are just a few types of content that are delivered across local broadband networks. Access to this content is made available through various types of infrastructure and kinds of connections available in the local network. Robust local infrastructure results in faster, more reliable access to content. Conversely, local infrastructure that is aging and built on older technologies results in slower, less reliable access to content.

Figure 7: How Broadband Connects Our Communities



## B. Dial-Up Access Platform

Though not defined as a broadband technology due to speed and bandwidth limitations, dial-up access still exists in many areas of the world. Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network (PSTN) to establish a connection to an Internet service provider (ISP) by dialing a telephone number on a conventional telephone line. Maximum speeds are usually 1.5M. This is by far the most limited delivery platform in use today.

## C. Digital Subscriber Line (DSL) Platform

DSL is a wireline transmission technology that transmits data over traditional copper telephone lines installed in homes and businesses. DSL-based broadband provides transmission speeds ranging from several hundred Kbps to 15 Mbps. Most providers offer speeds in the 10M to 15M range. The availability and speed of DSL service depends on the distance from your home or business to the closest telephone company facility.

The following are types of DSL transmission technologies:

- Asymmetrical Digital Subscriber Line (ADSL/ADSL2/ADSL2+/VDSL) – Used primarily by customers who receive a lot of data but do not send much. ADSL typically provides faster speed in the downstream direction than the upstream direction. ADSL allows faster downstream data transmission over the same line used to provide voice service, without disrupting regular telephone calls on that line.
- Symmetrical Digital Subscriber Line (SDSL) – Used typically by businesses for services such as video conferencing, which need significant bandwidth both upstream and downstream.

## D. Cable Modem Platform

Cable modem service enables cable operators to provide broadband using the same coaxial cables that deliver pictures and sound to your TV set. Most cable modems are external devices that have two connections: one to the cable wall outlet, the other to a computer. They provide, on average, transmission speeds of 1.5 Mbps to 100 Mbps, with some being able to offer higher speeds such as 300 Mbps, however, speeds greater than 50 Mbps are usually only offered in larger markets. Cable companies are attempting to bring faster speeds to market, but are having limited success due to the copper delivery technology. Subscribers can access their cable modem service by simply turning on their computers, without dialing-up an ISP. You can still watch cable TV while using it. Transmission speeds vary depending on the type of cable modem, cable network, and traffic load. Speeds are usually faster than DSL. Also, cable technology makes it difficult to constantly achieve the marketed speed. High traffic or additional subscribers on the cable feeder system can significantly slow down the access speeds to the end-user. This is why you will see cable packages marketed as “up to” designated speed with no guarantee of marketed speed.

## E. Fiber Optics Platform

Fiber optic technology converts electrical signals carrying data to light and sends the light through transparent glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding current DSL or typical cable modem speeds, typically by tens or even hundreds of Mbps. Theoretically, the speed limitation of fiber is the “speed of light”. The actual speed you experience will vary depending on a variety of factors, such as how close to your computer the service provider brings the fiber and how the service provider configures the

service, including the amount of bandwidth used. The same fiber providing your broadband can also simultaneously deliver voice (VoIP) and video services, including video-on-demand.

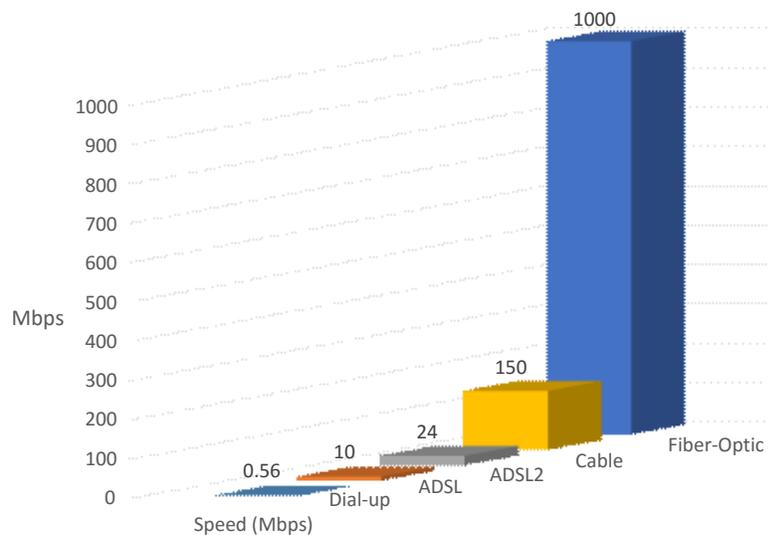
Variations of the technology run the fiber all the way to the customer’s home or business, to the curb outside, or to a location (node) somewhere between the provider’s facilities and the customer.

- Fiber to the Node (FTTN) - Fiber to the Node technologies bring high-capacity fiber-optic cables to local services areas to connect to existing DSL equipment. Rather than bringing fiber-optic cables to every home or business, the fiber is connected to the existing DSL network to increase its capacity. It allows these networks to carry more traffic; however, often times the copper-based “last mile” DSL network, connecting homes and businesses to the local nodes is still a bottleneck and results in subscribers not able to access the true speeds of fiber-optic connections.
- Fiber to the Premise (FTTP) - Fiber-To-The-Premise is a technology for providing Internet access by running fiber optic cable directly from an Internet Service Provider (ISP) to a user's home or business. It facilitates much faster speeds than dial-up and most coaxial cable Internet connections, and generally needs to be serviced less. It's also considered one of the most "future proof" types of Internet technology, since there are no foreseeable devices that could use more bandwidth than can be sent via fiber optic cables.

[Figure 8](#) contains a comparison of other wireline broadband technologies such as DSL and cable to fiber-based next-generation broadband. Whereas traditional broadband technologies currently have an upper limit of approximately 150Mbps, next-generation broadband that utilizes fiber-optic connections surpasses these limitations and can provide 1Gbps and higher.

*Figure 8: Technology Bandwidth (Speed) Comparisons*

- Dial-Up – 56 Kbps
  - Old Technology
  - Shared Data/Voice Technology
- ADSL – 10 Mbps
  - 1<sup>st</sup> Generation of DSL
  - Shared Data/Voice Technology
- ADSL2 –24 Mbps
  - 2nd Generation of DSL
  - Shared Data/Voice Technology
- Cable – 150 Mbps
  - Majority Uses DOCSIS 3.0
  - Shared Data/Voice Technology
- Fiber-Optic – 1 Gbps
  - GPON and/or Active Ethernet
  - Shared and Dedicated Data/Voice Technology



## F. Wireless Platform

Wireless broadband connects a home or business to the Internet using a radio link between the customer's location and the service provider's facility. Wireless broadband can be mobile or fixed. Wireless technologies using longer-range directional equipment provide broadband service in remote or sparsely populated areas where other platforms would be too costly to provide. Currently, speeds are generally comparable to DSL, but technology continues to improve allowing for somewhat higher speeds. An external antenna is usually required. Wireless broadband Internet access services offered over fixed networks allow consumers to access the Internet from a fixed point while stationary, and require a direct line-of-sight between the wireless transmitter and receiver. Mobile wireless broadband services are also becoming available from mobile telephone service providers and others. These services are generally appropriate for highly mobile customers and require a special PC card with a built in antenna that plugs into a user's laptop computer. Generally, they provide lower speeds, in the range of 3M.

## G. Infrastructure Evaluation and Recommendation

Today, the lightning-quick fiber-optic network is quickly expanding its footprint and is leading the future of high-speed information sharing. Since the data is being transmitted with light pulses instead of electrical current, it gives fiber optics several distinct advantages over other technologies.

- Fiber-optic networks have a large advantage over DSL and cable in that fiber has an extremely wide bandwidth which allows for increased information carrying capacity.
- Fiber technology helps to minimize signal loss. This means as a signal travels along a transmission line the signal will naturally lose strength as the distance increases. In a copper wire (DSL/Cable), the signal loses strength as the frequency of the information signal increases but in an optical fiber network there is virtually no loss of signal strength until very high bandwidths. This allows fiber based platforms to have a significant lower rate of transmission errors.
- Another advantage of fiber optics is its small size and weight which allows it to be more efficient than copper wires which need more lines to achieve the same transmission capacity as fiber. The reduced number of lines allows for maximum space utilization.
- Fiber is symmetrical, meaning it can reach the same speeds downloading or uploading. This is critical for businesses and telecommuters who must upload large files or perform large data backups.

- Finally, the last major advantage of fiber optics is the elimination of external interference found with copper based cables. This allows fiber based platforms to have a significant lower rate of transmission errors.

Fiber-optic networks have been identified as “disruptive technology”. Disruptive in the good sense that fiber is an innovation that helps create a new value market, and will eventually go on to displace the earlier technologies of DSL and cable. Although fiber is still basically in its early stages we can still look ahead and infer that it will replace the old copper cable infrastructure in the coming decades. We have seen such technology overtake the old in the past such as the case with floppy disks and CDs and USB drives so it is entirely possible that the same can happen here.

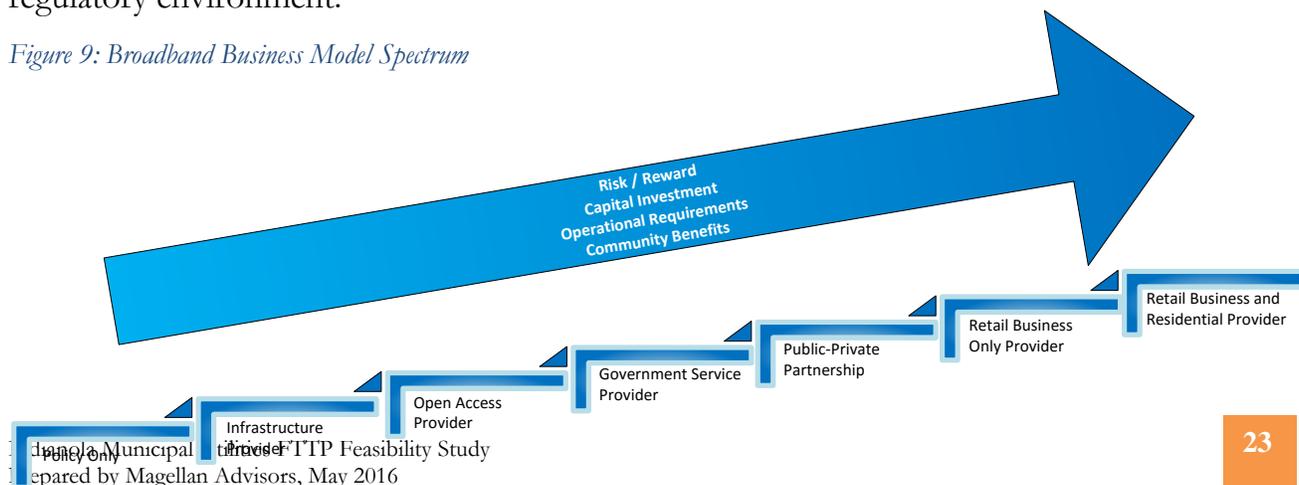
Therefore, it is our recommendation, that in order for Indianola to position itself to meet its community’s current and future needs, a fiber-optic platform would be the only clear choice for the infrastructure network.

## Business Model Options

With a clear understanding of a fiber optic network’s capabilities, the focus of this study shifts to answer the question, “What are the best options (i.e. business models) for utilization of a city-wide fiber optic network to deliver broadband services to the community?” There are several business model options for Indianola to consider that may be attractive to IMU.

Selecting the right business model or combination of models for IMU’s broadband strategy depends greatly on the specific environment, market, needs, appetite for risk, funding availability, payback, and return requirements. The commonly implemented business models fall on a continuum that begins with low risk, low impact options and ends with higher risk, higher impact options. Figure 9 illustrates this continuum. As the Study evaluates the various business model options from left to right, it will detail greater degrees of risk and reward; risk, in terms of financial, operational, and regulatory risk; reward, in terms of community benefits, revenue generation, and overall profitability. IMU must determine the most appropriate risk/reward balance to achieve its goals. To do so, Magellan has evaluated each business model to hone in on those that are most feasible for Indianola to consider. This evaluation accounted for local market, competition, funding requirements, organizational capabilities, and the regulatory environment.

Figure 9: Broadband Business Model Spectrum



## **A. City Policy Modifications**

Policy modifications is not a true business model, but is being mentioned as an expected addition to the other models in this section. Broadband-friendly policies should encourage broadband implementation and reduce the cost of broadband infrastructure construction. Strategic policies enable more opportunities for the installation of broadband infrastructure in conjunction with other public and private projects occurring within IMU's jurisdiction. Public policy tools are constructed and implemented according to each city's existing ordinances and processes; there is no one single approach to creating effective policies.

This could include ease of permitting, right of way access, lower construction permitting fees, joint trenching standards ("Dig Once"), etc. There is little financial risk in implementing policy tools because they require little upfront funding if managed correctly. In some cases, municipalities have struggled with incorporating broadband into their existing land use policies because they are unfamiliar with how to manage a new "utility" type of asset. This requires the collaboration of multiple departments and the ability of these departments to work together to a common goal. IMU should expect that some new business and operational processes would be required as well as changes to existing processes in order for the policies to be effective.

With regulatory barriers in Iowa and Indianola being minimal, policy changes in and of themselves will most likely not entice a new high-end provider to Indianola.

## **B. Infrastructure Provider**

In this model, IMU builds out the fiber network then leases "dark fiber" and/or sells the physical infrastructure, such as conduit, dark fiber, poles, tower space, and property to broadband service providers that need access within the community. "Dark fiber" means that the providers, themselves, are responsible for providing the needed equipment to deliver their services across the network. These providers are often challenged with the capital costs required to construct this infrastructure, particularly in high cost urbanized environments. IMU builds out the infrastructure to provide a cost effective alternative to providers constructing the infrastructure themselves. In these cases, IMU would generally use a utility model or enterprise fund model to develop programs to manage these infrastructure systems, and offer them to broadband service providers using standardized rate structures.

## **C. Open-Access Provider**

As with the Infrastructure model, IMU builds out the fiber network, however, in addition, it also equips the network with the electronics necessary to "light" the network to establish a "transport service" for service providers. Any and all qualified service providers are connected from a common interconnection point on the IMU network to create an "open-access" network giving providers access to all customers connected to the network. The concept of open-access is designed to enable competition among multiple service providers across the

network owned by IMU. By providing the ability to aggregate local customers on a single network, service providers are able to compete efficiently and cost effectively to deliver needed services. IMU remains neutral and ensures non-discriminatory practices and access for all providers who operate on the network. IMU would then establish a standard rate structure and terms of service for use by all participating service providers.

## **D. Government Services Provider**

As a government service provider, IMU would utilize its lit fiber-optic network to interconnect public organizations (commonly referred as a community anchor institution or “CAI”) with network connectivity. These organizations are generally limited to the CAI’s that fall within their jurisdiction, including local governments, school districts, higher educational organizations, public safety organizations, utilities, and healthcare providers. The majority of these CAI’s require higher capacity connectivity, and often, the network operator (i.e. IMU) would provide higher capacity at lower costs than these organizations are able to obtain commercially. Local government networks across the country have been built to interconnect cities, counties, school districts, and utilities to one another at lower costs and with long-term growth capabilities that support these organizations’ future needs and protect them from rising costs. In these cases, IMU would extend networking to CAIs that may be cities, counties, or consortia that build and maintain the network. The entities utilize inter-local agreements between public agencies to establish connectivity, rates and the terms and conditions of service.

## **E. Public-Private Partnership**

A Public-Private Partnership (“PPP”) is a negotiated agreement between public and private entities to expand broadband services in a given geographical area. PPP’s have gained popularity over recent years as more cities put in public broadband networks in conjunction with private broadband providers. PPP’s leverage public broadband assets, such as fiber, conduit, poles, facilities with private broadband provider assets and expertise to increase the availability and access to broadband services. IMU would make targeted investments in their broadband infrastructure and make it available to broadband providers with the goal of enticing providers to service their communities. In this type of model, IMU would be considered an Infrastructure Provider who maintains permanent ownership interest in the broadband infrastructure.

Broadband PPP’s are growing in popularity because they align public organizations and private providers, leveraging each other’s core strengths. A PPP would alleviate IMU from the requirements to provide retail or wholesale broadband services and allow them to employ their broadband infrastructure and policies with providers who take on these responsibilities.

IMU currently has a PPP with Mahaska Communications Group (MCG) offering MCG access to IMU’s fiber network in exchange for set fees per resident or business connected to the network. Through discussions with MCG as part of this Study, MCG does desire to keep the PPP in place with fees remaining relatively the same. MCG may be open to adjusting fees, however, the current fees would need to more than double for residents and approximately

35% for businesses to generate a cumulative positive cash flow within seven years. We do not believe this would be a viable model for IMU and MCG going forward.

If IMU desires to still pursue another PPP relationship, IMU should investigate interest from other qualified providers to see if there is any interest in this type of arrangement. This is an important first step for IMU to take in that it will help IMU understand what benefits can be achieved working in partnership with existing broadband providers. As every public-private partnership is different, IMU should consider some key questions such as exactly what they desire from the partnership, who would manage the partnership; does it make sense long-term, et al. Fundamental alignment between the public and private partner(s) is important for successful PPP's. IMU's goals must be balanced with private sector goals and strategies. These goals and strategies must fulfill each party's critical needs and must be forged early in the process. The identification and selection of the right partner(s) is paramount to success in the project. Execution risks can be high for municipalities that do not have a clear understanding of the true needs of their communities or those of broadband providers.

## **F. Retail Service Provider – Business Only**

Some entities have chosen to provide retail end-user services to businesses-only customers due to historically higher margins, a more stable market, and reduced cost to connect premises versus the residential market. Most commonly, entities provide a double-play of voice and Internet services to the local businesses. In many cases, a municipality may have built a fiber network for the purposes of connecting the City's primary governmental locations and then expanded the network to connect local businesses in an effort to enhance local economic development needs for recruitment and retention of businesses. Entities that provide these services are responsible for managing customers at a retail level. This means that IMU would manage all operational functions necessary to connect customers to the network and provide Internet and voice services. IMU would compete directly with local service providers in the local business market, which requires IMU to initiate and manage an effective sales and marketing function in order to gain sufficient market share to operate at the desired return rate. Prior to offering voice services in Iowa, IMU must obtain a "Certificate of Public Convenience and Necessity".

## **G. Retail Service Provider – Business & Residential**

Entities that provide end-user services to businesses and residential customers are considered retail service providers. Most commonly, they provide Internet, voice, and video services to their community through direct service implementation and/or relationships with wholesale service providers. In many cases, entities are using wholesale relationships to provide VoIP voice services and video services allowing for lower cost entry for these services. As a retail service provider, IMU would be responsible for a significant number of operational functions, including management of its retail offerings, network operations, billing, provisioning, network construction, installation and general operations and maintenance. IMU would compete with other local service providers and must be effective in its sales and marketing program to gain

sufficient market share to support the operation. IMU would also need to comply with state and federal statutes for regulated telecommunications service provider. They must also comply with state statutes concerning municipal and public utility broadband providers; a set of rules has been developed in most states that govern the financing, provision, and deployment of these enterprises. Prior to offering voice services in Iowa, IMU must obtain a “Certificate of Public Convenience and Necessity”.

## H. Business Model Comparison

Below is a comparison chart of the various business models discussed.

Figure 10: Comparison of Business Models

	Infrastructure Provider	Government Services Provider	Open Access Provider	Public-Private Provider	Retail Business Provider	Retail Business & Residential Provider
<b>Services Offered</b>	<ul style="list-style-type: none"> <li>• Conduit</li> <li>• Right of way</li> <li>• Dark fiber</li> <li>• Tower space</li> <li>• Property</li> </ul>	<ul style="list-style-type: none"> <li>• Connectivity service to public organizations</li> <li>• Conduit</li> <li>• Right of way</li> <li>• Dark fiber</li> <li>• Tower space</li> <li>• Property</li> </ul>	<ul style="list-style-type: none"> <li>• Wholesale transport service to service providers</li> <li>• Connectivity service to public organizations</li> <li>• Conduit</li> <li>• Right of way</li> <li>• Dark fiber</li> <li>• Tower space</li> <li>• Property</li> </ul>	<ul style="list-style-type: none"> <li>• Wholesale transport service to service providers</li> <li>• Connectivity service to public organizations</li> <li>• Conduit</li> <li>• Right of way</li> <li>• Dark fiber</li> <li>• Tower space</li> <li>• Property</li> </ul>	<ul style="list-style-type: none"> <li>• Internet, voice, and other business-focused retail services</li> <li>• Connectivity service to public organizations</li> <li>• Conduit</li> <li>• Right of way</li> <li>• Dark fiber</li> <li>• Tower space</li> <li>• Property</li> </ul>	<ul style="list-style-type: none"> <li>• Internet, voice, video and other business and residential retail services</li> <li>• Connectivity service to public organizations</li> <li>• Conduit</li> <li>• Right of way</li> <li>• Dark fiber</li> <li>• Tower space</li> <li>• Property</li> </ul>
<b>Customers</b>	<ul style="list-style-type: none"> <li>• Service providers</li> <li>• Community anchors</li> </ul>	<ul style="list-style-type: none"> <li>• Service providers</li> <li>• Community anchors</li> </ul>	<ul style="list-style-type: none"> <li>• Service providers</li> <li>• Community anchors</li> </ul>	<ul style="list-style-type: none"> <li>• Residential</li> <li>• Business</li> </ul>	<ul style="list-style-type: none"> <li>• Business</li> <li>• Service providers</li> </ul>	<ul style="list-style-type: none"> <li>• Residential</li> <li>• Business</li> </ul>
<b>Opportunity</b>	<ul style="list-style-type: none"> <li>• Accelerate broadband deployments</li> <li>• Improvements to general broadband access and availability</li> <li>• Reduce costs to provide new services</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced capacity and capabilities to community anchors</li> <li>• Increased efficiencies and collaboration among public organizations</li> <li>• Reduced cost for public organization</li> </ul>	<ul style="list-style-type: none"> <li>• Specialized fiber service to serve business and economic development</li> <li>• Establish a more competitive market with more providers</li> <li>• Accelerated delivery to market</li> </ul>	<ul style="list-style-type: none"> <li>• Triple-play services to homes and businesses</li> <li>• Control over how and where services are available to maximize community impact</li> <li>• Accelerated delivery to market</li> <li>• Possible revenue share</li> </ul>	<ul style="list-style-type: none"> <li>• Improved services to business community</li> <li>• Establish a more competitive market with more providers</li> </ul>	<ul style="list-style-type: none"> <li>• Triple-play services to homes and businesses</li> <li>• Control over how and where services are available to maximize community impact</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Slow uptake</li> <li>• Inefficient utilization of assets</li> </ul>	<ul style="list-style-type: none"> <li>• Execution and collaboration with other public organizations</li> </ul>	<ul style="list-style-type: none"> <li>• Operating expertise</li> <li>• Meeting service provider performance requirements</li> <li>• Service provider adoption of a municipal broadband network</li> </ul>	<ul style="list-style-type: none"> <li>• Operating expertise</li> <li>• Meeting service provider performance requirements</li> <li>• Service provider adoption of a municipal broadband network</li> </ul>	<ul style="list-style-type: none"> <li>• Operating expertise</li> <li>• Significant funding required</li> <li>• Competition with service providers</li> </ul>	<ul style="list-style-type: none"> <li>• Operating expertise</li> <li>• Significant funding required</li> <li>• Competition with service providers</li> <li>• Politically challenging</li> <li>• Market response</li> <li>• Questionable financial sustainability</li> </ul>

## I. Business Model Recommendation

Based on feedback from IMU regarding their risk-reward tolerance and strong desire to bring their community state-of-the-art Internet service, Magellan believes that IMU’s best strategy is to become a fully accredited residential and business retail provider utilizing IMU’s current and future fiber-optic network. IMU and the City of Indianola should also review current City policies with the goal to streamline broadband implementation and reduce the cost of broadband infrastructure construction.

## Broadband Infrastructure Overview

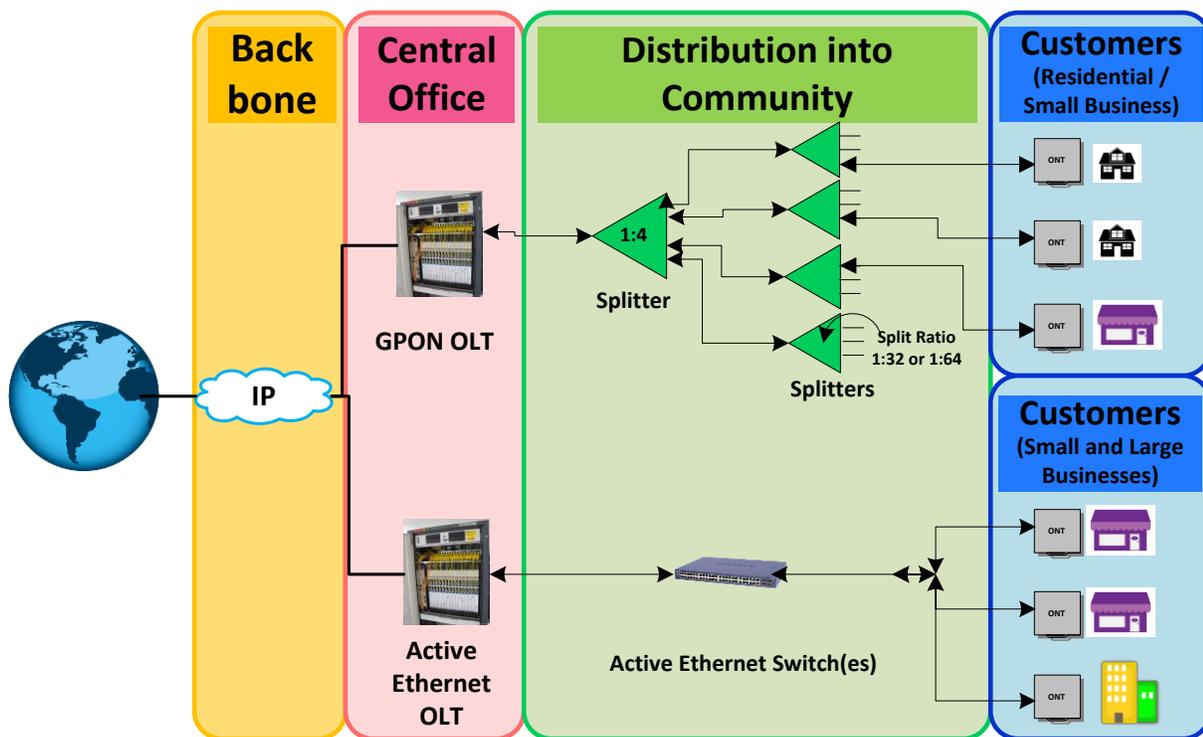
As IMU already has installed and maintained a fiber-optic network in the eastern section of Indianola, they have the critical knowledge to build out and maintain the desired network expansion throughout Indianola.

IMU’s network expansion will be based on leading edge fiber-optic broadband platform that provides direct fiber-optic connections (“FTTP”) to homes, businesses, and CAI’s across the service territory. Fiber-optic connectivity is the “gold standard” for broadband service providers. It is the only current technology that provides almost unlimited long-term scalability for broadband networks to accommodate the ever growing bandwidth/speed needs of users. Bandwidth/speed is based solely on the capabilities of the network equipment. The underlying fiber network remains as-is. As equipment capabilities are improved, only upgrades to the equipment are needed to achieve greater bandwidths/speeds. The network will be capable of providing as much bandwidth as consumers require, including one Gigabit (1 GB) to the home. The network will utilize GPON and Active Ethernet technologies to deliver services across the fiber platform. These two technologies together will allow IMU to easily offer customized solutions to end-users.

The following technical overview shows the high level framework for IMU to extend its fiber-optic network utility. In basic terms, a backbone fiber network will be expanded in Indianola as the main transmission vehicle to carry information back and forth to the world wide web. The backbone interfaces with the distribution/feeder networks, which in turn, connects to the premise drop network that connects to individual residences and businesses. In the center of the networks is the controlling hub called the central office/headend. The central/office headend is where the main equipment to connect and distribute the fiber signals throughout the network is stored.

The figure below shows a conceptual depiction of how the network is structured.

Figure 11: Conceptual Network Diagram Using GPON and Active Ethernet Topologies



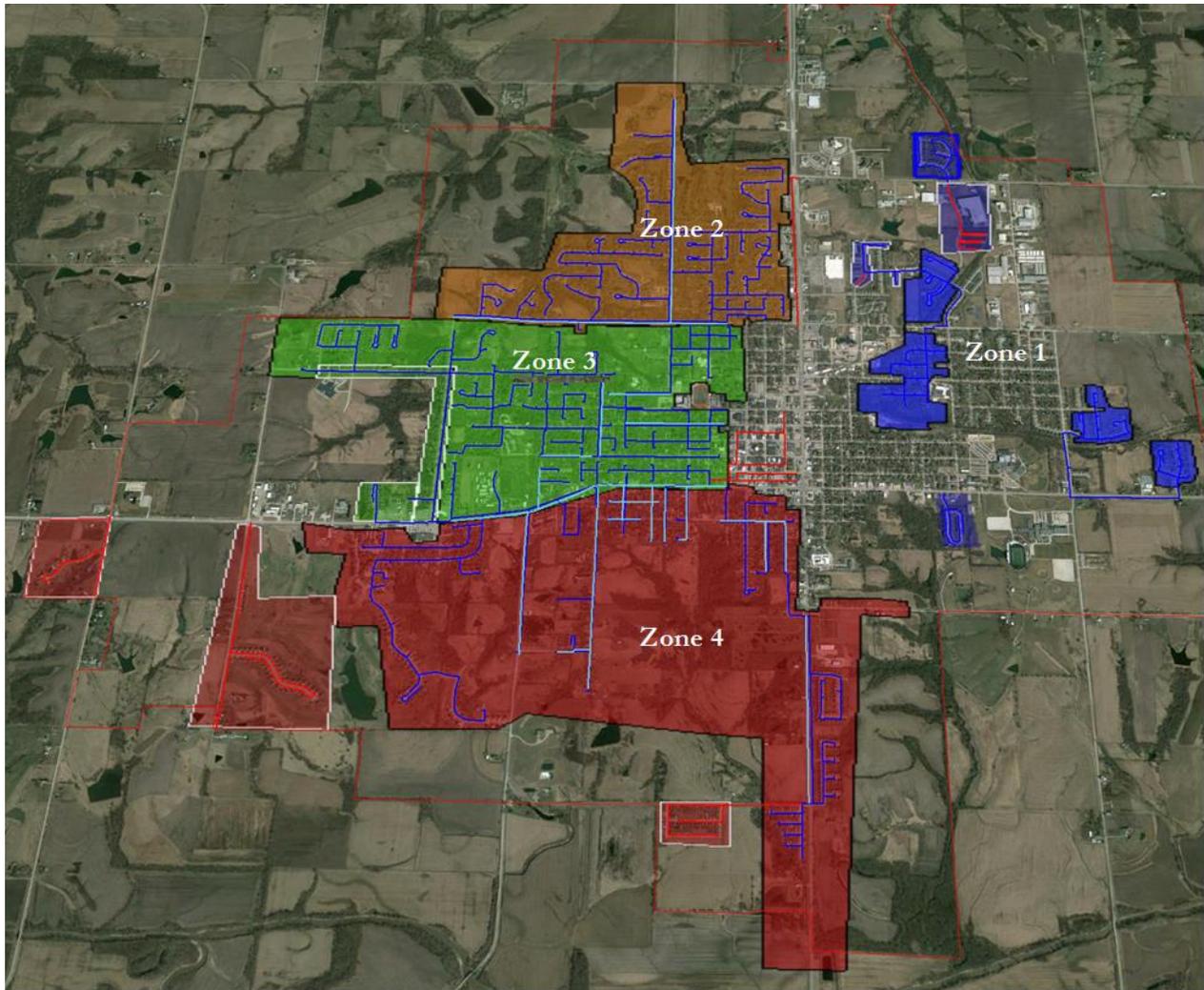
## A. Fiber Network Expansion

[Figure 12](#) illustrates the proposed backbone and distribution/feeder expansion fiber routes that would be built within Indianola. Currently, all proposed fiber would be placed underground unless there is a compelling reason identified during engineering/design to go aerial.

The distribution/feeder fiber network will interconnect the backbone fiber network with outdoor cabinet broadband enclosures placed strategically throughout the service area, ultimately providing distribution fiber to provide for both GPON and Active Ethernet services. Distribution cables will be sized based on the demand forecast and sizing of each enclosure to ensure that each service area is well equipped for both GPON and Active Ethernet services. Also, some strands will be reserved for GPON and Active Ethernet home run connectivity. Home run connectivity is a direct connection from the central office to a premise in lieu of going through the normal splitter topology.

The distribution/feeder fiber network is laid out into four zones covering Indianola. The zone strategy is designed to do buildout of the distribution/feeder fiber network in phases to allow the Indianola broadband utility to start bringing service to sections of its community as soon as possible. This also starts revenue generation while the remaining phases are being constructed.

Figure 12: Proposed Fiber Expansion



## B. Headend

A central office/headend owned and operated by the IMU will be required in a location central to the Indianola service area to provide a termination point for all of the broadband utility's fiber-optic cables. IMU's current headend facility is believed to have enough additional space to house any needed additional equipment and provide the necessary environmental system, including dual cooling/dehumidifying units, dual utility power feeds, generator backup, fire suppression, and alarm monitoring. The central office/headend will also house the broadband equipment for GPON and Active Ethernet services providing the local access for the surrounding service area.

## C. Drop Fiber Network

The drop fiber network will extend the fiber network from the distribution network to each business or residence within a service zone. From each distribution cabinet located on the

distribution network, fiber will be installed to pedestals placed in proximity to premises within service areas. Fiber will be terminated and pre-provisioned in pedestals to ensure a simple process for drop fiber installers to connect premises to the fiber network. Fiber distribution to pedestals will be sized based on the particular service area density to provide service to between 8-12 premises. Drop fibers, containing two fiber strands, will be direct buried, in most cases, 12” underground and will be connected between an underground vault and terminated at each residence and business using either an outdoor or indoor ONT (Optical network Terminal).

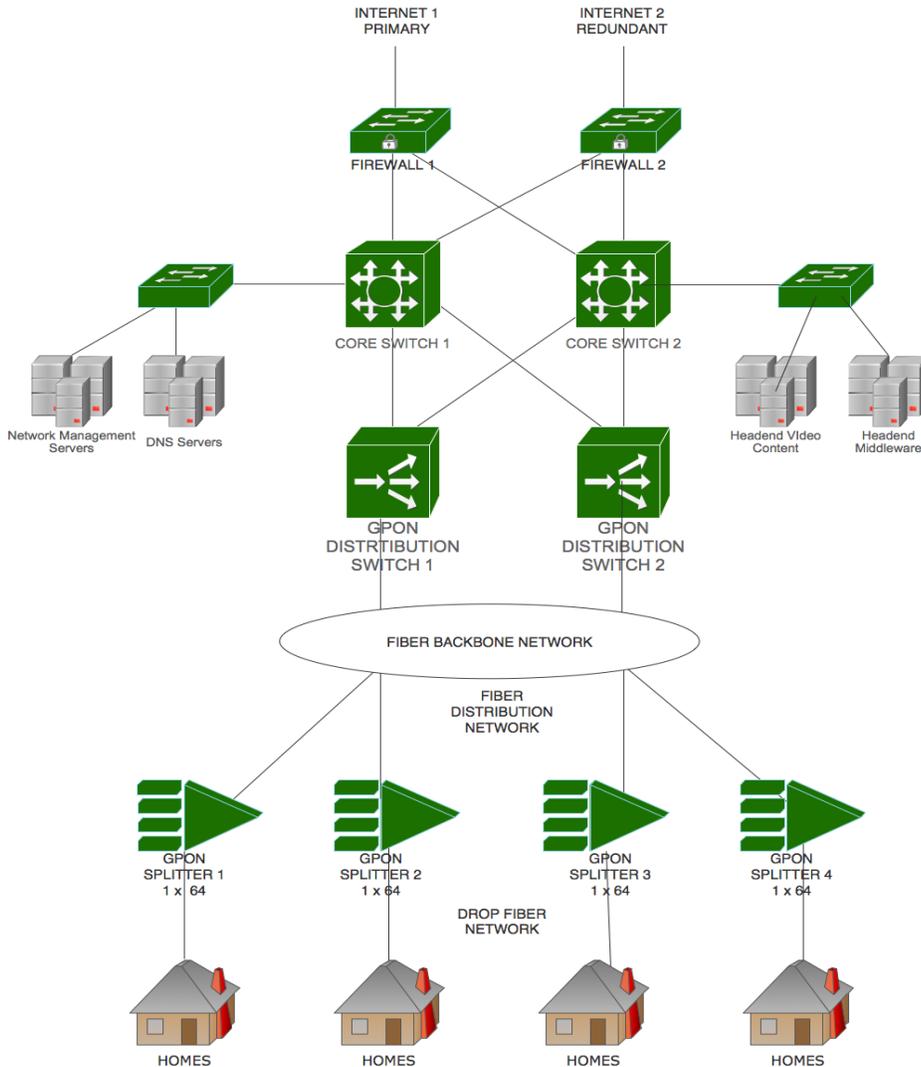
#### **D. Optical Network Terminals (ONTs)**

The Optical Network Terminal (ONT) is the demarcation point that is defined between the fiber network and the customer. In typical residential or small business deployments, the ONT will be either surface mounted on the exterior or mounted indoor at the customer’s premise where the drop fiber is terminated inside the ONT utilizing a pre-connectorized drop. ONTs will require a power source and UPS furnished by IMU to ensure power interruptions do not cause service outages.

#### **E. Network Equipment**

In order to deliver service over the fiber network, there needs to be sequence of core network equipment installed and utilized. This section will give a brief overview of the equipment and how it is used to deliver service to the end customer. In the diagram below, [Figure 13](#), the main network components are shown as they connect to the network.

Figure 13: Service Delivery Schematic



### Core Equipment

The core network equipment will serve as the switching and routing center for the fiber network. All equipment will be required to maintain full redundancy (e.g. redundant fans, power supplies, etc.). Core switches (switch/routers) will support 1Gbps connections and must scale to 10Gbps. All connections into the distribution/access network will connect through the core infrastructure to deliver the individual services. [Figure 14](#) defines the key features of the core network equipment and associated service requirement.

Figure 14: Service / Core Equipment Requirements

Service Requirement	Core Equipment Requirement
---------------------	----------------------------

Scalable infrastructure particularly focusing on advanced broadband applications.	Core network platform that will provide high-availability, redundancy, performance and scalability to grow broadband offerings and provide guaranteed service levels to customers and service providers.
Redundancy Factors	The core network equipment must be offered in a choice of different form factors purpose built for high availability. Equipment must have several levels of redundancy built-in to allow for a maximum amount of uptime and redundancy.
Performance Factors	The equipment must be capable of providing line-rate forwarding for all core interfaces and have enough line card storage to grow out to full capacity.
Scalability Factors	The broadband network will be required to support a minimum of 1 Gigabit for all core interconnections. Upgrades to existing capacity must be available from 1 Gigabit to multiple Gigabit, 10 Gigabit and 40 gigabit speeds.
Quality of Service Factors	Equipment must provide QOS to classify, mark, prioritize, queue and forward multiple types of traffic that require different service levels from the network. Management of the QOS system is also an important part of managing the new core infrastructure and the network management systems should be capable of providing reports, graphs, alarms and fault management.
Management Factors	The core network equipment must support management protocols that will allow staff to easily monitor, manage and maintain the network infrastructure. An accompanying network management system capable of configuration, software and device management is important to manage the core network.

### *Distribution Equipment*

Distribution equipment will consist of a single or dual GPON shelves located in the central office/headend. The GPON shelf must be equipped with dual CPUs, dual power supplies, dual fan trays, and hot swappable line cards and controller cards. GPON equipment will interconnect with IMU's core equipment at 10Gbps, utilizing dual redundant uplinks to the core switches. GPON shelves will contain GPON 1x32 or 1x64 line cards to provide GPON distribution services to residents and small businesses throughout the network.

GPON shelves will be provisioned through the network management and provisioning systems, allowing IMU to auto-provision customers without manual configuration of the systems. For residential and small business users, auto-provisioning will enable IMU to significantly reduce the amount of staff hours required to manage customer activations, terminations, and changes. It will also allow IMU to minimize errors in the provisioning process due to misconfiguration of resources within the GPON shelves.

## Internet Equipment

Separate from the core switches, the broadband utility will maintain an “Internet perimeter”. The Internet perimeter will include Internet routers and Internet firewalls to be used to manage routing throughout the network. Firewalls will be utilized to protect critical back office systems, including provisioning, network management, data storage, and other information. IMU’s two core switches will be interconnected to two Internet routers providing redundancy for Internet services in the event of a single interface or equipment failure.

Magellan recommends that the utility contract with two Internet providers, allowing for failover in the event that either provider is unavailable. To do so, Magellan recommends that the utility purchase a primary “tier 1” Internet provider connection that will be used during normal operations. Tier 1 is recommended to ensure that the utility provides a high-quality Internet service to its users, although this service will come at a slightly higher cost than other Internet transit providers offer. The utility will balance this cost with a tier 2 Internet provider to be used for its backup connection which will automatically carry IMU’s Internet traffic in the event that the primary provider becomes unavailable. The cost of the Tier 2 connection will be significantly lower than the cost of the primary connection, thus bringing the average cost of Internet wholesale service to the utility down significantly.

## Day-to-Day Broadband Utility Operations Overview

### A. Overview

IMU will provide the foundation for critical communications to local residents, businesses, government organizations, and community anchors. IMU must implement effective and efficient human resources along with capable system solutions to ensure an excellent “customer experience”. In order to reduce costs, the utility should investigate enabling sharing of resources with the current IMU staff, wherever possible. As IMU’s network and subscriber base grows, it will be important that IMU implement efficient operating strategies that will manage the functions effectively yet minimize operating cost. A key differentiator of local supported networks is their attention to responsive, localized, customer service. IMU must focus on implementing such a customer service program designed to support its service level agreements with residents, businesses, and community anchors.

Key operational functions that will be required for ongoing management of the broadband utility include, but not limited to:

- Drop fiber connection to end-users
- Inside wiring and inspection of end-user premises
- Service installation
- Order management and provisioning

- Customer inquiry and support
- Trouble ticketing
- Billing and payments
- Repairs and maintenance
- Network management
- Renewal and replacement

This list only provides a basic framework for the functions required to operate a broadband residential and business service provider entity. From these processes, IMU will be able to identify key functions that require both human and system resources, and in turn, design operations that will fit well within the organization and fulfill the requirements of the broadband utility. When the utility opts to implement an operational system, a more thorough evaluation of specific human and system resources will need to be conducted for the broadband utility.

## **B. Staffing Requirements**

The functions listed below should be used as guidelines for general responsibilities rather than specific job descriptions. Adding new staff is often times challenging for utilities implementing community broadband projects. Therefore, we break down each function FTE requirements so that IMU may plan shared or new staff around the time requirements of each function. We also provide a matrix of how staff requirements change over time in a 10-year schedule as the network and subscriber count increases in size and matures.

Magellan recommends that the IMU utilize shared staff, where possible, to conserve operating dollars until the point where the network requires more dedicated staff which will occur when the size of the operation and/or revenues generated reach a critical point. In many community broadband networks of similar size to Indianola’s proposed network, existing staff has been able to effectively manage the network for the first 12-18 months of operations. In addition, outside consulting services are often times used in the first one-two years of the project to complement existing internal staff capabilities. As internal staff becomes more versed in operating and maintaining the broadband network, outside consulting services are reduced, which reduces operational cost considerably for the organization. The key staffing assumptions utilized in this Study include:

### **Manager-Level FTE Positions**

- **Communications Superintendent** – Department Head level position for the broadband utility reporting to the General Manager.
- **Accounting & Finance** – equivalent to a controller for a broadband utility.
- **Sales & Marketing Coordinator** - responsible for all outside sales and marketing functions for the broadband utility, including go-to-market strategy, pricing, quota management, and top-line revenue growth.

### Staff-level FTE Positions

- **Field Services Crew Chief** - responsible for all outside plant operations and maintenance activities. Would hire one full-time resource until number of subscribers support the need for this position.
- **Headend Technician** - manage all Internet headend services such as routine network management and maintenance, service quality management, provisioning, contractor management, troubleshooting, et al. Also provide tier-2 technical support.
- **Voice Technician** - manage all voice services in the headend. Should be cross-trained with headend technician duties for coverage purposes. Also provide tier-2 technical support.
- **Field Technicians** - manage all customer installations, average two-three installations per day.
- **Customer Service Coordinators** - handle customer order department and manage the billing platform, billing integration, complex billing issues, and produce billing reports.
- **Customer Service Reps** – manage customer ordering, processing, service, billing inquiries, etc. and basic tier-1 technical support
- **GIS Coordinator** - manage all mapping of the physical network incorporating all key information as possible (e.g. equipment locations, make, model; demographics, etc.)

Below is the anticipated staffing needs for the first ten years of operation. Please note that staffing needs can change due to many factors such as accelerated uptake rates, use of outside contractors, and change in operational policies (e.g. extending support hours) to name a few.

Figure 15: Initial Staffing Plan

	Year #	1	2	3	4	5	6	7	8	9	10
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
<b>Total FTE</b>											
FTE A - Communications Superintendent	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE A - Sales & Marketing Coordinator	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE A - Accounting & Finance	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE A - Admin (Cost Allocation for Current IMU)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
FTE D - Field Services Crew Chief	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE D - GIS Coordinator	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
FTE D - Customer Service Coordinator	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE D - Customer Service Rep	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
FTE D - Voice Technician	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE D - Headend Technician	0.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FTE D - Field Technician	1.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
<b>Total FTE</b>	<b>4.05</b>	<b>11.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>	<b>12.80</b>
<b>Total Costs</b>											
FTE A - Communications Superintendent	110,700	114,021	117,442	120,965	124,594	128,332	132,182	136,147	140,231	144,438	
FTE A - Sales & Marketing Coordinator	-	76,478	78,772	81,135	83,569	86,076	88,658	91,318	94,058	96,879	
FTE A - Accounting & Finance	-	69,525	71,611	73,759	75,972	78,251	80,599	83,016	85,507	88,072	
FTE A - Admin (Cost Allocation for Current IMU)	31,500	32,445	33,418	34,421	35,454	36,517	37,613	38,741	39,903	41,100	
FTE D - Field Services Crew Chief	70,200	72,306	74,475	76,709	79,011	81,381	83,822	86,337	88,927	91,595	
FTE D - GIS Coordinator	-	38,239	39,386	40,567	41,785	43,038	44,329	45,659	47,029	48,440	
FTE D - Customer Service Coordinator	-	69,525	71,611	73,759	75,972	78,251	80,599	83,016	85,507	88,072	
FTE D - Customer Service Rep	23,625	97,335	100,255	103,263	106,361	109,551	112,838	116,223	119,710	123,301	
FTE D - Voice Technician	-	90,383	93,094	95,887	98,763	101,726	104,778	107,921	111,159	114,494	
FTE D - Headend Technician	21,938	90,383	93,094	95,887	98,763	101,726	104,778	107,921	111,159	114,494	
FTE D - Field Technician	57,038	117,498	181,535	186,981	192,590	198,368	204,319	210,449	216,762	223,265	
<b>Total Direct Staffing</b>	<b>\$ 172,801</b>	<b>\$ 575,668</b>	<b>\$ 653,450</b>	<b>\$ 673,053</b>	<b>\$ 693,245</b>	<b>\$ 714,042</b>	<b>\$ 735,463</b>	<b>\$ 757,527</b>	<b>\$ 780,253</b>	<b>\$ 803,661</b>	
<b>Total Administrative Staffing</b>	<b>\$ 142,200</b>	<b>\$ 292,469</b>	<b>\$ 301,243</b>	<b>\$ 310,280</b>	<b>\$ 319,588</b>	<b>\$ 329,176</b>	<b>\$ 339,051</b>	<b>\$ 349,223</b>	<b>\$ 359,699</b>	<b>\$ 370,490</b>	
<b>Total Costs</b>	<b>\$ 315,001</b>	<b>\$ 868,137</b>	<b>\$ 954,692</b>	<b>\$ 983,333</b>	<b>\$ 1,012,833</b>	<b>\$ 1,043,218</b>	<b>\$ 1,074,515</b>	<b>\$ 1,106,750</b>	<b>\$ 1,139,952</b>	<b>\$ 1,174,151</b>	

## Services – What Would the Broadband Utility Offer?

### A. Demand and Revenue Generation

The revenue model developed for this Study has been built based on market penetration forecasts for each customer segment (e.g. residential and business) and service offerings. Following is a summary of the expected demand and revenue generation based on each customer segment.

### B. Products Models

After researching and reviewing several product models, IMU desired to offer just two residential offerings, both based on a 1 Gbps Internet service. The first offering is an Internet only package designed to give residents a 1 Gbps bandwidth/speed at a price not seen currently in the Indianola market. The package would meet and exceed the various needs of residents, while giving the residents a significant advantage to utilize the ever expanding web services without the need for continual upgrading of service. The second package groups a full featured VoIP telephone service along with the 1 Gbps Internet. For businesses and CAI's in Indianola, the Internet offerings would be multi-tiered to give these entities more options to find the best fit based on their size and needs. IMU will also have the opportunity to provide a portfolio of value-added, specialized services to meet the specific needs of the business and CAI community.

### C. Rates and Pricing Process

Rates have been developed using first a “bottom up” approach that identifies rates based on cost coverage for IMU and a cost-plus model to determine margin requirements. This allows IMU to understand what minimum rates IMU would need to implement to cover its cost of IMU and operations. It also shows IMU what rate level they need to consider so that they are not unintentionally offering services below cost.

After completion of this analysis, Magellan also performed a “top down” review of the market rates that IMU would need to charge to be competitive in the market. Through Magellan's research, we have identified current market rates that exist for the Internet providers serving in Indianola. IMU should strive to be competitive in the market and as a new entrant maintain slightly lower than market rates for its fiber-based services while offering more bandwidth on a fiber-based platform to its customers. The goal is to offer a better service at a similar, if not lower, price to its customers; incentivizing uptake in the market.

Sensitivity analysis should be conducted on IMU's potential rate structure to determine what financial results should be achieved for IMU. This Study has estimated an average 2% rate increase per year for services. This 2% increase is spread generally across all services; however,

IMU should apply the rate increases to only the services that require them. Changes in annual rate increases have significant impacts on overall financial performance and particularly free cash flows. IMU must decide how it will balance its rates against financial requirements, which should be determined in the creation of IMU Business Plan, as a next step to this Study.

## D. Residential

After the rate analysis was complete, we reviewed the model with the IMU team to look at various options centered on the analysis. Through subsequent discussions of options and penetration analysis with the Indianola team, it has been determined to offer a one-tier Internet offering that is aggressively priced to drive high penetration rates and a double-play offering including VoIP telephone services to the Internet service.

Figure 16: PROPOSED Residential Offerings

Offering	Features	Price
Internet-Premium 1Gbps	1 Gbps Down / 1 Gbps Up bandwidth	\$ 70.00
Internet-Premium 1 Gbps with 1 VoIP telephone line	1 Gbps Down / 1 Gbps Up bandwidth; Local and long-distance telephone service	\$ 95.00

It is expected that penetration growth will be aggressive in the first years due to outstanding price performance of the single tier offering and strong latent demand for high-speed broadband services (Figure 17 and Figure 18). As the initial market demand is filled, the rate of growth will tend to level out with growth mainly based on new residents locating to Indianola. It is important that IMU meet the projections in the demand forecast as these forecasts are tied directly to overall revenues and cash flow generated by IMU. IMU needs to achieve around a 40% market share of residential Internet customers to achieve the financial performance projected in this Study.

Figure 17: Residential Demand Forecast @ 40%

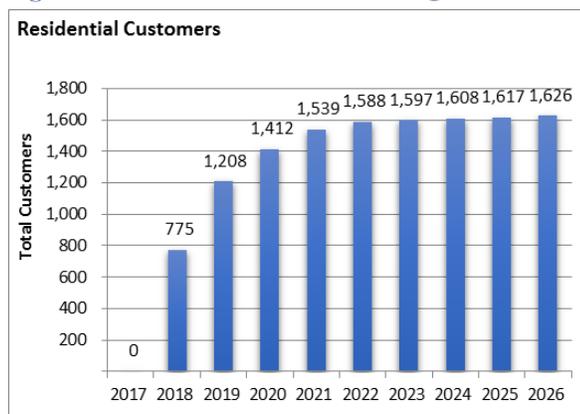
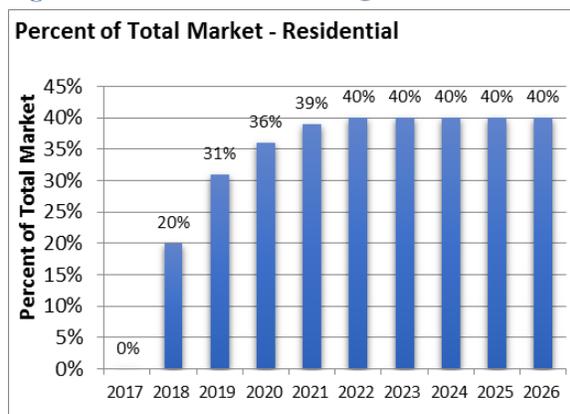
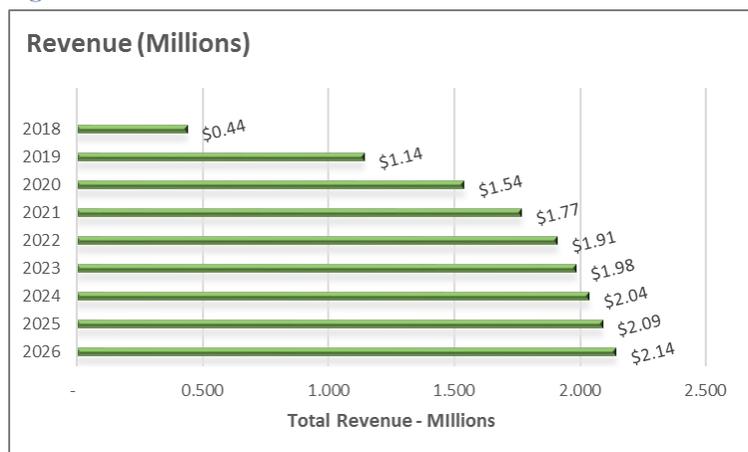


Figure 18: Residential Penetration @ 40%



Revenues generated by IMU’s broadband utility consist of monthly recurring service fees and customer premise equipment rental. In the residential market, installation and activation fees are usually waived and are factored into monthly service fees. As shown below, revenues grow in direct correlation with the customer growth (i.e. uptake); therefore, uptake is a key determinant of overall revenues as well as gross profit and net profit margin. Revenues across IMU’s market segments will be heavily dominated by residential services. Residential services are projected to make up approximately 67% of IMU’s total revenues for the project. Residential revenues are very sensitive to fluctuations in residential uptake; therefore, it’s important that IMU maintain strong growth and minimal churn in its residential market year after year.

Figure 19: Total Residential Revenues



## E. Business

The small business market has historically been multi-tiered due to the vast differences in business size and needed services. However, for Indianola it has been decided to trim down the number of tiers to simplify the choices and give each tier supreme price performance. Business VoIP voice services will be offered per line with the prerequisite that the business has or will have IMU Internet service prior to voice installation.

Figure 20: PROPOSED Small Business Offerings

Offering	Specifications	Price
SMB 100	Bandwidth: 100M Down / 10M Up	\$ 119.00
SMB 1000	Bandwidth: 1000M Down / 150M Up	\$ 350.00
SMB Voice Per Line	Must have IMU Internet	\$ 50.00

In Indianola, business growth and penetration percentage should closely match the yearly percentage growth projections for the residential market. Business installations will be strong in the first few years and slowly flatten out as the initial market demand is addressed. Additional growth this period will mainly be new businesses locating to Indianola. As with the residential

market, it is imperative that IMU meet the projections in customer growth, as illustrated below (Figure 21 and Figure 22) as these forecasts are tied directly to overall revenues and cash flow generated by IMU. IMU needs to achieve a 40% market share of business Internet customers to achieve the financial performance projected in this Study.

Figure 21: Business Demand Forecast

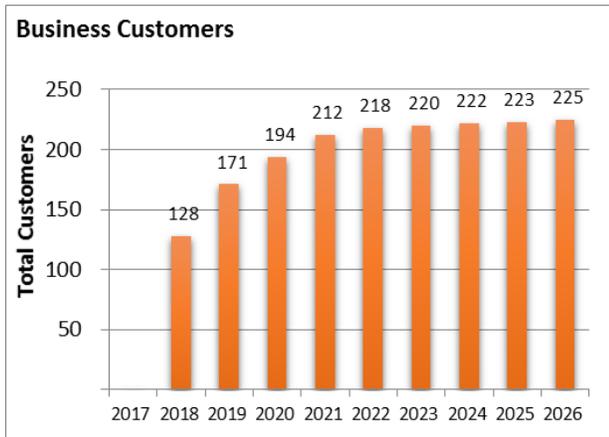
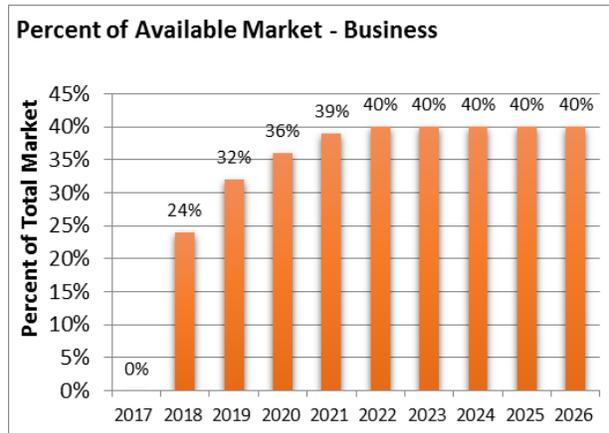
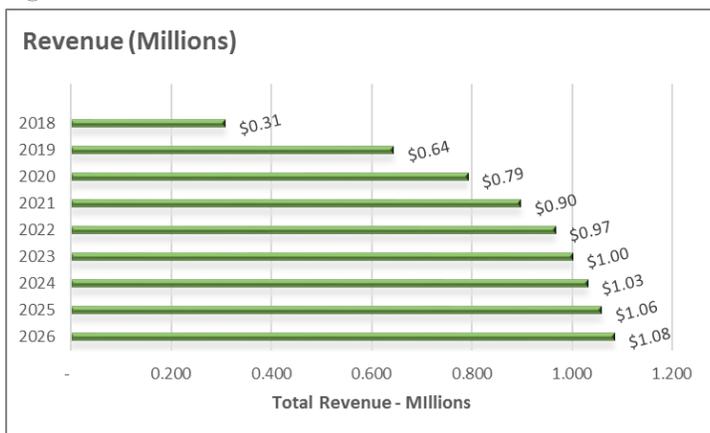


Figure 22: Business Market Penetration



Business revenues generated consist of monthly recurring service fees and customer premise equipment rental. Also, due to the higher complexity of business installations versus residential installations, there will be one-time installation and activation fees based on offering. As with residential market, business revenues are directly linked to business customer uptake; thus, uptake is a key factor of overall revenues as well as gross profit and net profit margin.

Figure 23: Total Small Business Revenue



For other business sectors such as Enterprise (i.e. larger sized businesses), there is usually no set price structure and services and rates are on an Individual Case Basis (“ICB”). Offerings are tailored to the individual business needs and agreed term of contract. This specific sector is not modeled in the Study’s Pro Formas since there are relatively few of these businesses in percentage to the small business sector. The Pro Formas should stand alone based on the residential and small business markets. However, IMU will still need to pursue Enterprise type

businesses since these entities are important to the community and capturing CAI's will positively affect the on-going financial model since they are not in the current plan.

## **F. Community Anchor Institutions**

Community Anchor Institutions (CAI) are modeled outside of residential and business markets. CAI's usually demand customized offerings with customized services and pricing. Due to the high fluctuations within the CAI marketplace, this Study does not address CAI's in the model, but IMU will still need to pursue them since these entities are important to the community. Capturing CAI's will positively affect the on-going financial model since they are not in the current plan.

## **Broadband Financial Plan**

The financial plan information provided below depicts a financial outlook for IMU's proposed broadband utility based on forecasts, projected revenues, capital costs, operational costs, and debt service for the project. This financial plan provides a model that determines IMU's financial performance under a particular set of conditions and assumptions. As IMU's business environment and conditions change, the outcomes produced in the model will also change. Therefore, it is important that IMU periodically update their forecast and financial model with changes in the business environment as it moves towards the decision to implement the broadband utility.

Magellan recommends a quarterly review of the forecast and financial plan for the first 12-month period to ensure that the assumptions made throughout this project remain valid. Magellan's modeling document has been engineered to allow IMU to request changes to key assumptions and then automatically update the underlying financial plan.

As forecasts and financial models are subject to change, Magellan cannot guarantee that financial outcomes will match those determined in the current model. No representation, warranty, or undertaking (express or implied) is made and no responsibility is taken by Magellan Advisors for the merchantability, adequacy, accuracy, or completeness for the model or its assumptions (inherent or explicit).

## **A. Funding Requirements**

Based on information, expectations, and discussions with IMU staff and finance advisors, the Study has determined that a financially viable broadband utility is feasible for IMU. Total capital needed at a 40% penetration (uptake) of possible subscribers, in addition to four years of working capital totals approximately \$16.4M. This total is comprised of \$6.7M for network feeder/distribution fiber design/construction, \$2.4M for drops (connections) to residential and business premises, \$2.5M for headend and general equipment, building improvements, and project management, and working capital of \$4.8M.

## **B. Funding Vehicles**

IMU would finance \$16.7M (capital, working capital, and additional funding to ensure positive free cash flow) through various funding vehicles. Current proposed financing model is to (1) get loans for capital costs through local banks; and (2) working capital from electric utility. Proposed loan structure through the banks would consist of a loan at 4.3% with a balloon payment after 5 years. The balloon payment would then be refinanced under new terms expecting an interest rate of 3.5% or lower.

Under this financing model and a 40% uptake by year 5, IMU would have a positive free cash flow from the onset of operations.

Free cash flow could be utilized to pay down additional debt or reinvest the proceeds into further system expansion. Magellan's analysis has provided a preliminary indication that IMU could develop a sustainable broadband entity; however, it is imperative that IMU continues this analysis in the next phase, which includes the development of a formal IMU Broadband Business Plan.

Figure 24: Network Capital Costs (feeder; distribution; equipment; building; etc.)

**Capital Plan**

<b>Feeder &amp; Distribution Fiber Design &amp; Construction</b>		<b>Totals</b>
<b>Total Costs</b>		
Zone 1	Labor	\$ 655,895
Zone 1	Materials	\$ 434,617
Zone 1 Total		\$ 1,090,512
<hr/>		
Zone 2	Labor	\$ 1,011,473
Zone 2	Materials	\$ 702,184
Zone 2 Total		\$ 1,713,656
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Zone 3	Labor	\$ 1,343,181
Zone 3	Materials	\$ 890,900
Zone 3 Total		\$ 2,234,081
<hr/>		
Zone 4	Labor	\$ 1,013,489
Zone 4	Materials	\$ 662,660
Zone 4 Total		\$ 1,676,149
Total Costs		\$ 6,714,398
<hr/>		
<b>Premises Connected</b>		
<b>Materials Cost</b>		
Connectorized Drop Fiber Cost Per Passing	Materials	\$ 382,025
Premise Inside Wiring Per Passing	Equipment	\$ 218,300
<b>Equipment Cost</b>		
Optical Network Terminal + Power Supply	Equipment	\$ 764,050
<b>Labor Cost</b>		
Drop Fiber Installation, Splicing and Termination Per Passing	Materials	\$ 436,600
Premise Equipment Installation Per Passing (2 Hours)	Materials	\$ 327,450
Premise Inside Wiring Per Passing	Equipment	\$ 261,960
<hr/>		
<b>Headend Equipment / PM</b>		
Core switch routers	Equipment	\$ 250,000
Fiber termination panels	Equipment	\$ 25,000
Firewalls	Equipment	\$ 20,000
Internet routers	Equipment	\$ 50,000
Intra-facility cabling	Equipment	\$ 10,000
Ladder/raceway	Equipment	\$ 20,000
OLTs (14 @ 25K)	Equipment	\$ 350,000
Racks/cabinets	Equipment	\$ 50,000
Switches, servers, storage	Equipment	\$ 100,000
Network Management Systems	Equipment	\$ 30,000
Provisioning Systems	Equipment	\$ 300,000
Billing Systems	Equipment	\$ 200,000
Installation & Project Management	Labor	\$ 375,000
<hr/>		
<b>Building Improvements</b>		
Data Center Building Improvements	Materials	\$ 200,000
NOC Improvements	Materials	\$ 250,000
Administrative Offices	Materials	\$ 100,000
<hr/>		
<b>General Equipment</b>		
Vehicles & Outfitting (3 @35K)	Equipment	\$ 105,000
Splicing Trailer	Equipment	\$ 20,000
OTDRs	Equipment	\$ 30,000
Mobile Test Sets	Equipment	\$ 10,000
Fusion Splicers	Equipment	\$ 25,000
Toolkits	Equipment	\$ 7,500
Miscellaneous Equipment	Equipment	\$ 15,000

## C. Pro Formas

Below is a comparison of five 20-year Pro Formas showing the financial performance based on revenue and cost projections. The five Pro Formas show financial projections based on business model and various residential-business penetration (i.e. uptake) levels.

Based on historical trends of other Magellan projects and expectations of the IMU team, we believe that the 40% model is a very achievable for IMU in the City of Indianola.

### *Financial Model Comparisons Based on Uptake Penetration*

Uptake Percentage (Residential-Business)	Wholesale 40%-40%	Retail 25% -25%	Retail 40% -40%	Retail 55% -55%	Retail 70% -50%
<b>Number of Subscribers</b>					
Residential	1726	1,078	1,726	2,372	3,020
Business	241	151	241	332	302
<b>Key Financial Metrics</b>					
Total Borrowing	\$11.1M	\$15.9M	\$16.7M	\$17.5M	\$17.9M
Year for Positive Net Income	Year 19	Year 22	Year 7	Year 4	Year 4
Total Reserve Balances	1.9M	\$2.75M	\$2.8M	\$3.0M	\$3.1M
<b>Capital Cost Summary</b>					
Fiber Buildout	\$6.74M	\$6.74M	\$6.74M	\$6.74M	\$6.74M
Drop Fiber	\$1.7M	\$1.5M	\$2.4M	\$3.3M	\$3.9M
Other Capital (hw, sw, facilities)	\$1.3M	\$2.5M	\$2.5M	\$2.5M	\$2.5M
Initial Operating (Startup) Costs	\$1.7M	\$4.68M	\$4.9M	\$4.9M	\$3.3M
<b>Cumulative Free Cash Flow (20 yr)</b>	<b>(15.5M)</b>	<b>(15.7M)</b>	<b>\$2.6M</b>	<b>\$21.0M</b>	<b>\$29.7M</b>

Please note: Actual detailed Pro Formas for the above matrix are included under separate cover.

## D. Financial Snapshots

Following are additional financial snapshots based on the 40% uptake financial scenario.

Figure 25 Financial Dashboard:

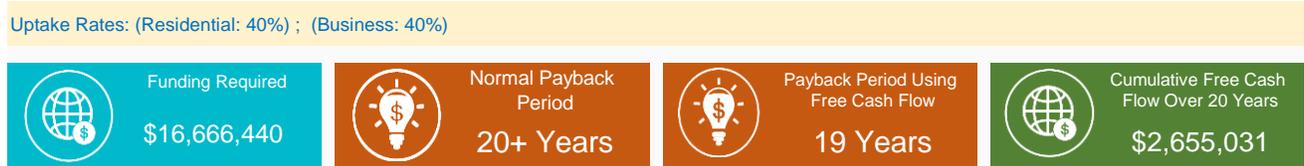


Figure 26: EBITA / Net Income (millions)

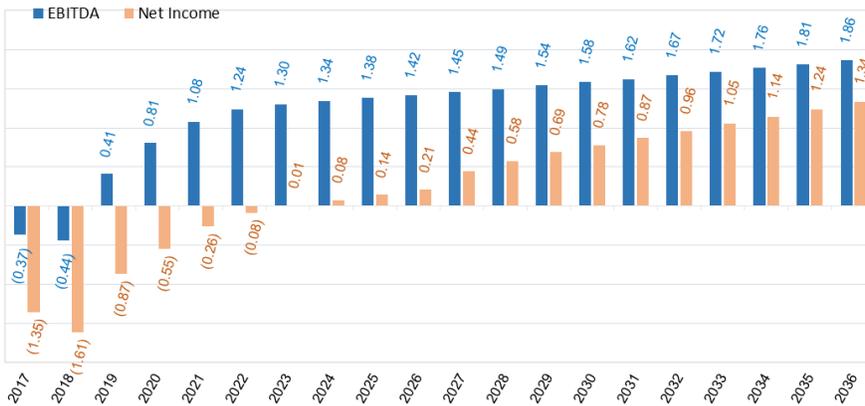


Figure 27: Cumulative Unrestricted Free Cash Flow (millions)

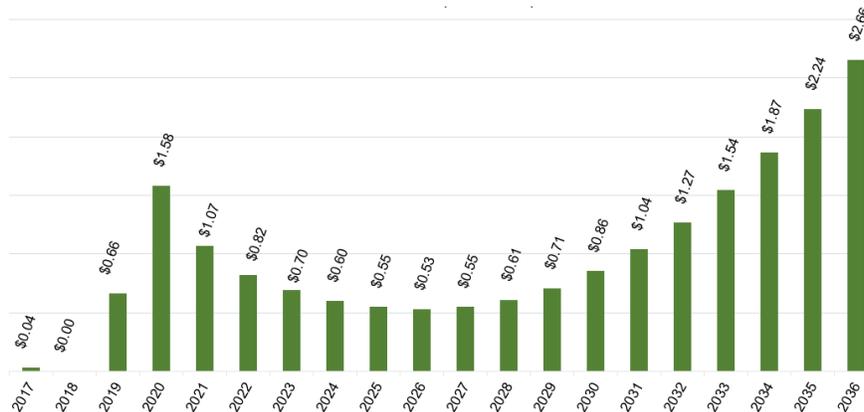
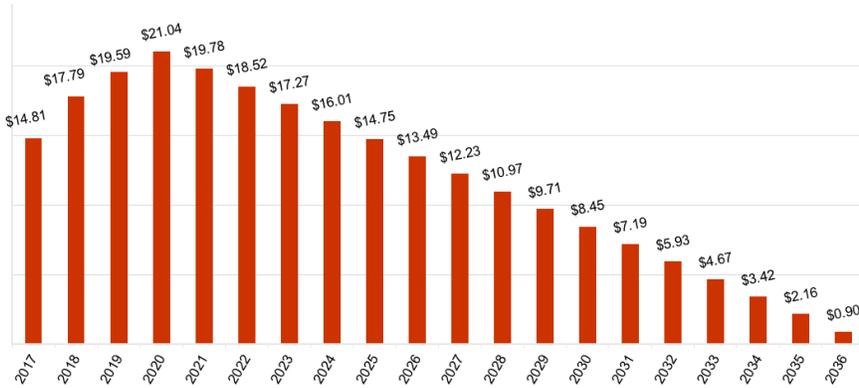


Figure 28: Debt Balance (millions)



## Conclusions and Recommendations

Based on the information reviewed during the Study, IMU has a significant opportunity to bring a city-wide fiber-optic network to its community to allow its community members access to state-of-the-art fiber-optics services not currently available in the vast majority of Indianola. The fiber-optic platform will allow IMU to keep pace with the fast growing portfolio of local government and utility cloud based services that could be provided to residents, businesses, and community anchors institutions. IMU's proposed Fiber-to-the-Premise network would be capable of providing Internet and value-added services across the community, with better reliability and performance than current services and at comparable, if not lower rates. The network would also become a strategic community asset in that it will be a key component in attracting and keeping residents and businesses in the Indianola area.

The success of a project hinges on the ability of IMU to deliver superior information services at similar or lower costs than are currently available. Doing so means that IMU will need to reinforce their current culture that understands the importance of delivering a quality service experience to its new Internet customers, a concept that IMU already embraces today with its utility subscribers. Quality customer experiences coupled with responsive customer service are two key differentiating factors that set municipal broadband utilities apart from traditional broadband providers. With this in mind, IMU is strongly positioned to deliver a better service to the residents and businesses of Indianola by implementing its own broadband communications utility.

Implementations of broadband utilities are complex and challenging projects technically, operationally, and financially. Magellan Advisors recommends that Indianola take a conservative and measured approach to implementing its utility, particularly focusing on building a sustainable operation through careful planning and phasing of the system.

As with most of our clientele, we suggest that IMU utilize a conservative and measured approach to rolling out the fiber-based platform and associated services.

## Next Steps

Based on the findings of this Study, Magellan has identified the following next steps for IMU to consider in implementing its broadband utility. These items comprise pre-implementation tasks that Magellan believes are critical prior to IMU embarking on implementing its broadband utility.

- Complete a full internal review of this FTTP Feasibility Study to ensure IMU's management has a comprehensive understanding of the project, its financial and funding needs, technical and operational requirements, and phases;
- Seek formal agreement and approvals from IMU on the findings of the FTTP Feasibility Study;
- Gain approval from IMU on the next steps in the broadband initiative, which would include the development of a formal Broadband Business Plan and Implementation Plan, to begin immediately following approval of the FTTP Feasibility Study. Plans, on average, take four to six months to complete, which is a similar timeline that will be required to investigate and finalize sources of funding.
- Begin the Design/Engineering process now. This process will take about four months and will deliver the full design package, RFP for construction, and engineers estimates validating the fiber buildout costs. The Design/Engineering package and engineer's estimates will be required before funding commitments can be obtained.
- Identify key resources within IMU who will manage development of the IMU FTTH Business Plan and Implementation Plan.
- IMU should start socializing the current financial models and funding plans with bond council, IMU legal resources, and any other key resources that could provide valuable insight into the process.

### Projected Costs for Next Step Tasks:

All of these tasks listed above must be completed prior to funding commitments being solidified. The Business Plan and Implementation Plan will provide required engineers estimates for all operating and capital expenses, while the Design/Engineering Process will provide engineers estimates for all fiber-optic construction. Following is the estimated cost projections for completing these tasks.

Task	Description	Cost Estimate
1. Develop FTTH Business Plan	Provide an investment grade business plan which will support project financing.	\$35,000
2. Develop Implementation Plan and Solicit Cost Proposals from Vendors	Develop an implementation plan that outlines the timeframe for deployment of FTTH services, develop RFPs as required and solicit proposals from vendors to provide valid engineers estimates.	\$45,000
3. FTTH Design/Engineering	Provide a full P.E approved design and engineering FTTH package which includes design documents, specs and standards, RFP package for construction and valid engineers' estimates.	\$302,000
<b>Estimated Total:</b>		<b>\$382,000</b>

\* All expenses will be billed at cost

## Appendix A - Glossary of Terms

Term	Definition
3G – Third Generation	The third generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.
4G – Fourth Generation	The fourth generation of mobile broadband technology, used by smart phones, tablets, and other mobile devices to access the web.
ADSL – Asymmetric Digital Subscriber Line	DSL service with a larger portion of the capacity devoted to downstream communications, less to upstream. Typically thought of as a residential service.
ADSS – All-Dielectric Self-Supporting	A type of optical fiber cable that contains no conductive metal elements.
AMR/AMI – Automatic Meter Reading/Advanced Metering Infrastructure	Electrical meters that measure more than simple consumption and an associated communication network to report the measurements.
ATM – Asynchronous Transfer Mode	A data service offering that can be used for interconnection of customer’s LAN. ATM provides service from 1 Mbps to 145 Mbps utilizing Cell Relay Packets.
Bandwidth	The amount of data transmitted in a given amount of time; usually measured in bits per second, kilobits per second (kbps), and megabits per second (mbps).
Bit	A single unit of data, either a one or a zero. In the world of broadband, bits are used to refer to the amount of transmitted data. A kilobit (Kb) is approximately 1,000 bits. A megabit (Mb) is approximately 1,000,000 bits. There are 8 bits in a byte (which is the unit used to measure storage space), therefore a 1 mbps connection takes about 8 seconds to transfer 1 megabyte of data (about the size of a typical digital camera photo).
BPL – Broadband over Powerline	A technology that provides broadband service over existing electrical power lines.
BPON – Broadband Passive Optical Network	BPON is a point-to-multipoint fiber-lean architecture network system which uses passive splitters to deliver signals to multiple users. Instead of running a separate strand of fiber from the CO to every customer, BPON uses a single strand of fiber to serve up to 32 subscribers.
Broadband	A descriptive term for evolving digital technologies that provide consumers with integrated access to voice, high-speed data service, video-demand services, and interactive delivery services (e.g. DSL, Cable Internet).
CAD – Computer Aided Design	The use of computer systems to assist in the creation, modification, analysis, or optimization of a design.
CAI – Community Anchor Institute	Community anchor institutions (CAIs, sometimes called anchor institutions) are usually non-profit organizations that often provide essential services to the public. Universities, colleges, community colleges, K12 schools, libraries, health care facilities, social service

Term	Definition
	providers, government and municipal offices are all community anchor institutions.
CAP – Competitive Access Provider	(or “Bypass Carrier”) A Company that provides network links between the customer and the Inter-Exchange Carrier or even directly to the Internet Service Provider. CAPs operate private networks independent of Local Exchange Carriers.
Cellular	A mobile communications system that uses a combination of radio transmission and conventional telephone switching to permit telephone communications to and from mobile users within a specified area.
CLEC – Competitive Local Exchange Carrier	Wireline service provider that is authorized under state and Federal rules to compete with ILECs to provide local telephone service. CLECs provide telephone services in one of three ways or a combination thereof: 1) by building or rebuilding telecommunications facilities of their own, 2) by leasing capacity from another local telephone company (typically an ILEC) and reselling it, and 3) by leasing discrete parts of the ILEC network referred to as UNEs.
CO – Central Office	A circuit switch where the phone lines in a geographical area come together, usually housed in a small building.
Coaxial Cable	A type of cable that can carry large amounts of bandwidth over long distances. Cable TV and cable modem service both utilize this technology.
CPE – Customer Premise Equipment	Any terminal and associated equipment located at a subscriber's premises and connected with a carrier's telecommunication channel at the demarcation point ("demarc").
CWDM – Coarse Wavelength Division Multiplexing	A technology similar to DWDM only utilizing fewer wavelengths in a more customer-facing application whereby less bandwidth is required per fiber.
Demarcation Point (“demarc”)	The point at which the public switched telephone network ends and connects with the customer's on-premises wiring.
Dial-Up	A technology that provides customers with access to the Internet over an existing telephone line.
DLEC – Data Local Exchange Carrier	DLECs deliver high-speed access to the Internet, not voice. Examples of DLECs include Covad, Northpoint and Rhythms.
Downstream	Data flowing from the Internet to a computer (Surfing the net, getting E-mail, downloading a file).
DSL – Digital Subscriber Line	The use of a copper telephone line to deliver “always on” broadband Internet service.
DSLAM – Digital Subscriber Line Access Multiplier	A piece of technology installed at a telephone company’s Central Office (CO) and connects the carrier to the subscriber loop (and ultimately the customer’s PC).

Term	Definition
DWDM – Dense Wavelength Division Multiplexing	An optical technology used to increase bandwidth over existing fiber-optic networks. DWDM works by combining and transmitting multiple signals simultaneously at different wavelengths on the same fiber. In effect, one fiber is transformed into multiple virtual fibers.
E-Rate	A Federal program that provides subsidy for voice and data circuits as well as internal network connections to qualified schools and libraries. The subsidy is based on a percentage designated by the FCC.
EON – Ethernet Optical Network	The use of Ethernet LAN packets running over a fiber network.
EvDO – Evolution Data Only	EvDO is a wireless technology that provides data connections that are 10 times as fast as a traditional modem.
FCC – Federal Communications Commission	A Federal regulatory agency that is responsible for regulating interstate and international communications by radio, television, wire, satellite and cable in all 50 states, the District of Columbia, and U.S. territories.
FDH – Fiber Distribution Hub	A connection and distribution point for optical fiber cables.
FTTN – Fiber to the Neighborhood	A hybrid network architecture involving optical fiber from the carrier network, terminating in a neighborhood cabinet with converts the signal from optical to electrical.
FTTP – Fiber to the premise (or FTTP – Fiber to the building)	A fiber optic system that connects directly from the carrier network to the user premises.
GIS – Geographic Information Systems	A system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.
GPON- Gigabit-Capable Passive Optical Network	Similar to BPON, GPON allows for greater bandwidth through the use of a faster approach (up to 2.5 Gbps in current products) than BPON.
GPS – Global Positioning System	a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.
GSM – Global System for Mobile Communications	This is the current radio/telephone standard developed in Europe and implemented globally except in Japan and South Korea.
HD – High Definition (Video)	Video of substantially higher resolution than standard definition.
HFC – Hybrid Fiber Coaxial	An outside plant distribution cabling concept employing both fiber optic and coaxial cable.
ICT – Information and Communications Technology	Often used as an extended synonym for information technology (IT), but it is more specific term that stresses the role of unified communications and the integration of telecommunications, computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information.

Term	Definition
IEEE – Institute of Electrical Engineers	A professional association headquartered in New York City that is dedicated to advancing technological innovation and excellence.
ILEC – Incumbent Local Exchange Carrier	The traditional wireline telephone service providers within defined geographic areas. Prior to 1996, ILECs operated as monopolies having exclusive right and responsibility for providing local and local toll telephone service within LATAs.
IP-VPN – Internet Protocol-Virtual Private Network	A software-defined network offering the appearance, functionality, and usefulness of a dedicated private network.
ISDN – Integrated Services Digital Network	An alternative method to simultaneously carry voice, data, and other traffic, using the switched telephone network.
ISP – Internet Service Provider	A company providing Internet access to consumers and businesses, acting as a bridge between customer (end-user) and infrastructure owners for dial-up, cable modem and DSL services.
ITS – Intelligent Traffic System	Advanced applications which, without embodying intelligence as such, aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.
Kbps – Kilobits per second	1,000 bits per second. A measure of how fast data can be transmitted.
LAN – Local Area Network	A geographically localized network consisting of both hardware and software. The network can link workstations within a building or multiple computers with a single wireless Internet connection.
LATA – Local Access and Transport Areas	A geographic area within a divested Regional Bell Operating Company is permitted to offer exchange telecommunications and exchange access service. Calls between LATAs are often thought of as long distance service. Calls within a LATA (IntraLATA) typically include local and local toll services.
Local Loop	A generic term for the connection between the customer's premises (home, office, etc.) and the provider's serving central office. Historically, this has been a wire connection; however, wireless options are increasingly available for local loop capacity.
MAN – Metropolitan Area Network	A high-speed intra-city network that links multiple locations with a campus, city or LATA. A MAN typically extends as far as 30 miles.
Mbps – Megabits per second	1,000,000 bits per second. A measure of how fast data can be transmitted.
MPLS – Multiprotocol Label Switching	A mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table.

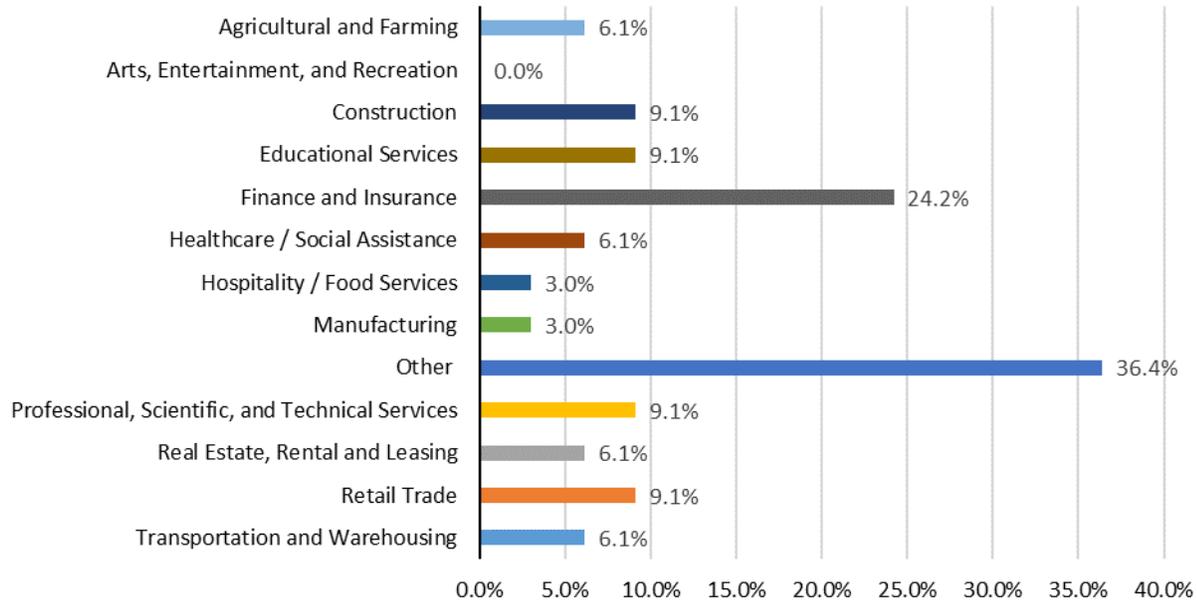
Term	Definition
ONT – Optical Network Terminal	Used to terminate the fiber optic line, demultiplex the signal into its component parts (voice telephone, television, and Internet), and provide power to customer telephones.
Overbuilding	Building excess capacity. In this context, it involves investment in additional infrastructure projects to provide competition.
OVS – Open Video Systems	OVS is a new option for those looking to offer cable television service outside the current framework of traditional regulation. It would allow more flexibility in providing service by reducing the build out requirements of new carriers.
PON – Passive Optical Network	A Passive Optical Network consists of an optical line terminator located at the Central Office and a set of associated optical network terminals located at the customer’s premise. Between them lies the optical distribution network comprised of fibers and passive splitters or couplers. In a PON network, a single piece of fiber can be run from the serving exchange out to a subdivision or office park, and then individual fiber strands to each building or serving equipment can be split from the main fiber using passive splitters / couplers. This allows for an expensive piece of fiber cable from the exchange to the customer to be shared amongst many customers, thereby dramatically lowering the overall costs of deployment for fiber to the business (FTTB) or fiber to the home (FTTH) applications.
QoS – Quality of Service	QoS (Quality of Service) refers to a broad collection of networking technologies and techniques. The goal of QoS is to provide guarantees on the ability of a network to deliver predictable results. Elements of network performance within the scope of QoS often include availability (uptime), bandwidth (throughput), latency (delay), and error rate. QoS involves prioritization of network traffic.
RF – Radio Frequency	a rate of oscillation in the range of about 3 kHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals.
Right-of-Way	A legal right of passage over land owned by another. Carriers and service providers must obtain right-of-way to dig trenches or plant poles for cable systems, and to place wireless antennae.
RMS – Resource Management System	A system used to track telecommunications assets.
RPR – Resilient Packet Ring	Also known as IEEE 802.17, is a protocol standard designed for the optimized transport of data traffic over optical fiber ring networks.
RUS – Rural Utility Service	A division of the United States Department of Agriculture, it promotes universal service in unserved and underserved areas of the country with grants, loans, and financing.
SCADA – Supervisory Control and Data Acquisition	A type of industrial control system (ICS). Industrial control systems are computer controlled systems that monitor and control industrial processes that exist in the physical world.

Term	Definition
SNMP – Simple Network Management Protocol	An Internet-standard protocol for managing devices on IP networks.
SONET – Synchronous Optical Network	A family of fiber-optic transmission rates.
Streaming	Streamed data is any information/data that is delivered from a server to a host where the data represents information that must be delivered in real time. This could be video, audio, graphics, slide shows, web tours, combinations of these, or any other real time application.
Subscribership	Subscribership is how many customers have subscribed for a particular telecommunications service.
Switched Network	A domestic telecommunications network usually accessed by telephone, key telephone systems, private branch exchange trunks, and data arrangements.
T-1 – Trunk Level 1	A digital transmission link with a total signaling speed of 1.544 Mbps. It is a standard for digital transmission in North America.
T-3 – Trunk Level 3	28 T1 lines or 44.736 Mbps.
UNE – Unbundled Network Elements	Leased portions of a carrier's (typically an ILEC's) network used by another carrier to provide service to customers.
Universal Service	The idea of providing every home in the United States with basic telephone service.
Upstream	Data flowing from your computer to the Internet (sending E-mail, uploading a file).
UPS – Uninterruptable Power Supply	An electrical apparatus that provides emergency power to a load when the input power source, typically main power, fails.
USAC – Universal Service Administrative Company	An independent American nonprofit corporation designated as the administrator of the Federal Universal Service Fund (USF) by the Federal Communications Commission.
VDSL – Very High Data Rate Digital Subscriber Line	A developing digital subscriber line (DSL) technology providing data transmission faster than ADSL over a single flat untwisted or twisted pair of copper wires (up to 52 Mbit/s downstream and 16 Mbit/s upstream), and on coaxial cable (up to 85 Mbit/s down and upstream); using the frequency band from 25 kHz to 12 MHz.
Video on Demand	A service that allows users to remotely choose a movie from a digital library whenever they like and be able to pause, fast-forward, and rewind their selection.
VLAN – Virtual Local Area Network	In computer networking, a single layer-2 network may be partitioned to create multiple distinct broadcast domains, which are mutually isolated so that packets can only pass between them via one or more routers; such a domain is referred to as a Virtual Local Area Network, Virtual LAN or VLAN.

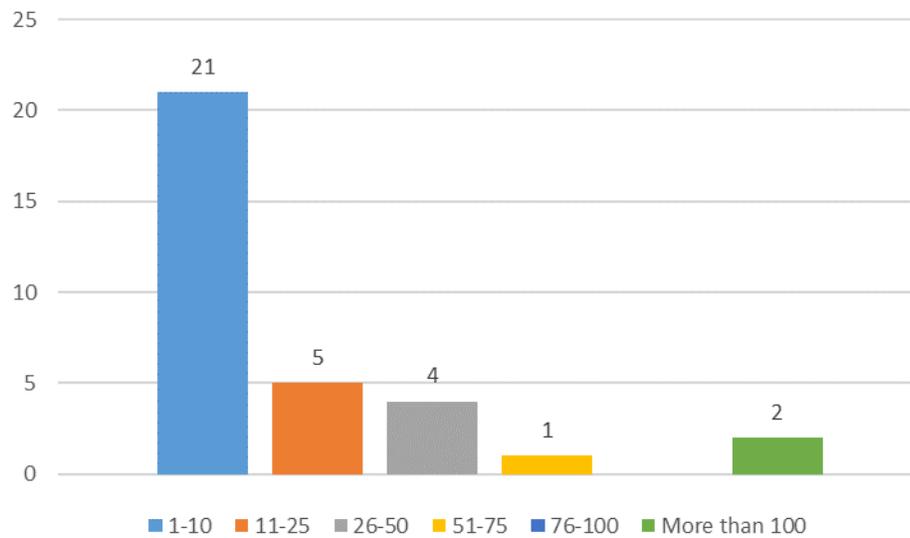
Term	Definition
VoIP – Voice over Internet Protocol	A technology that employs a data network (such as a broadband connection) to transmit voice conversations using Internet Protocol.
VPN – Virtual Private Network	A virtual private network (VPN) extends a private network across a public network, such as the Internet. It enables a computer to send and receive data across shared or public networks as if it were directly connected to the private network, while benefitting from the functionality, security and management policies of the private network. This is done by establishing a virtual point-to-point connection through the use of dedicated connections, encryption, or a combination of the two.
WAN – Wide Area Network	A network that covers a broad area (i.e., any telecommunications network that links across metropolitan, regional, or national boundaries) using private or public network transports.
WiFi	WiFi is a popular technology that allows an electronic device to exchange data or connect to the Internet wirelessly using radio waves. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards".
WiMax	WiMax is a wireless technology that provides high-throughput broadband connections over long distances. WiMax can be used for a number of applications, including “last mile” broadband connections, hotspot and cellular backhaul, and high-speed enterprise connectivity for businesses.
Wireless	Telephone service transmitted via cellular, PCS, satellite, or other technologies that do not require the telephone to be connected to a land-based line.
Wireless Internet	1) Internet applications and access using mobile devices such as cell phones and palm devices. 2) Broadband Internet service provided via wireless connection, such as satellite or tower transmitters.
Wireline	Service based on infrastructure on or near the ground, such as copper telephone wires or coaxial cable underground or on telephone poles.

# Appendix B - Business Survey Results

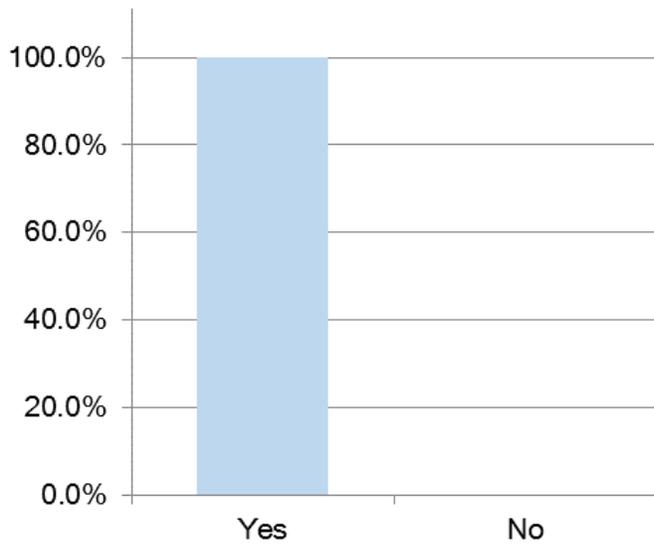
## I. Which industry would you classify your business under?



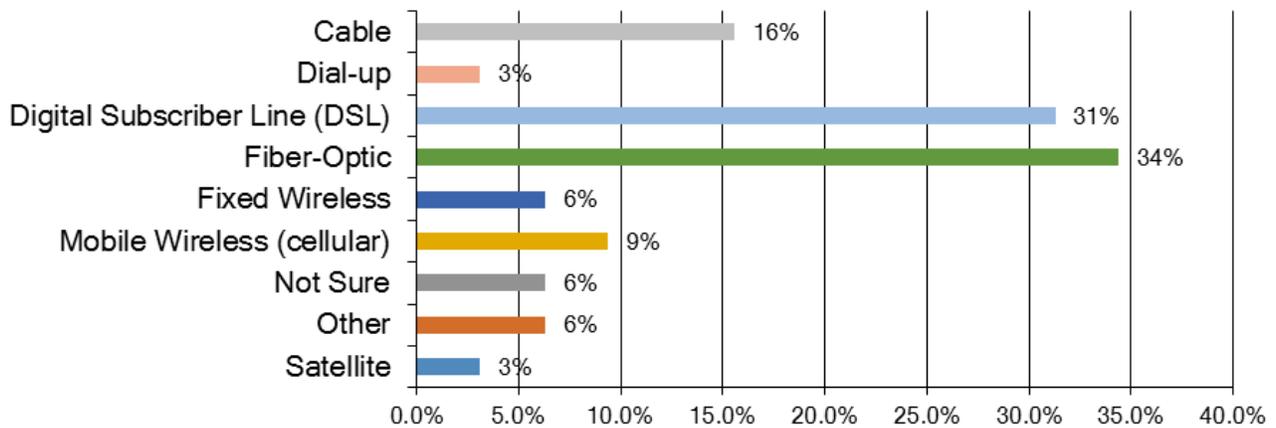
## II. How many employees in your business? (Indianola only)



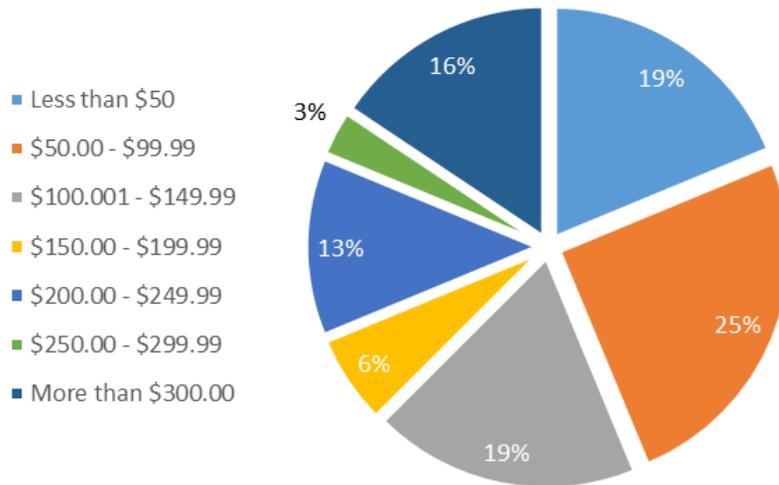
### III. Do you currently have Internet service at your place of business?



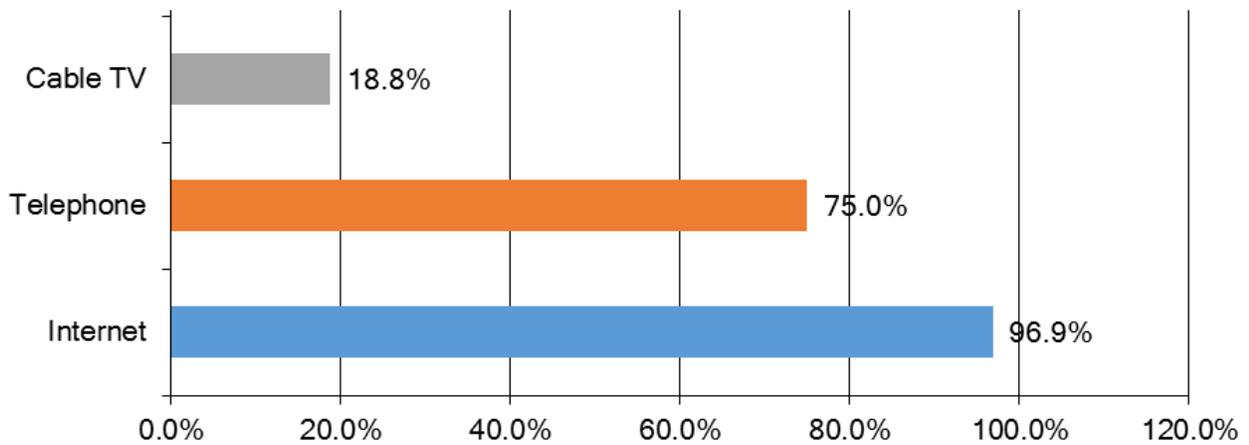
### IV. What type of Internet service do you have at your business?



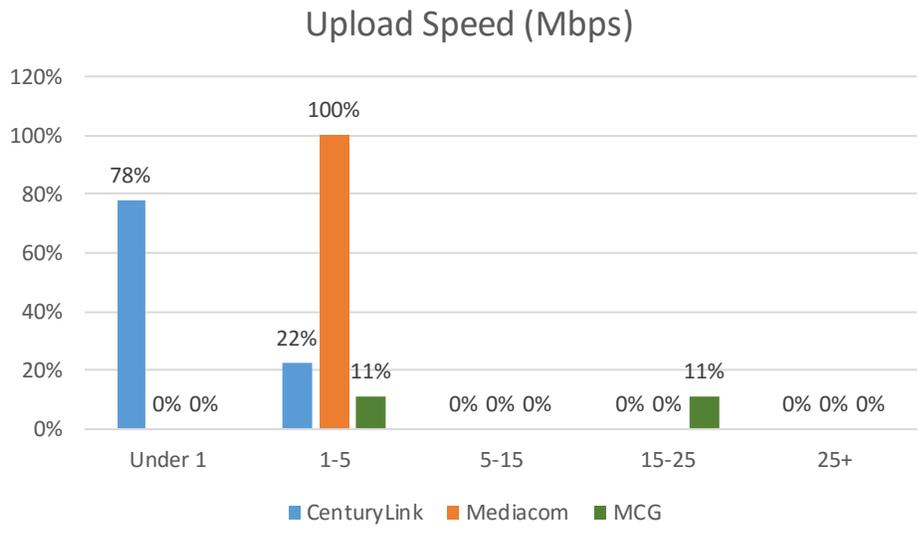
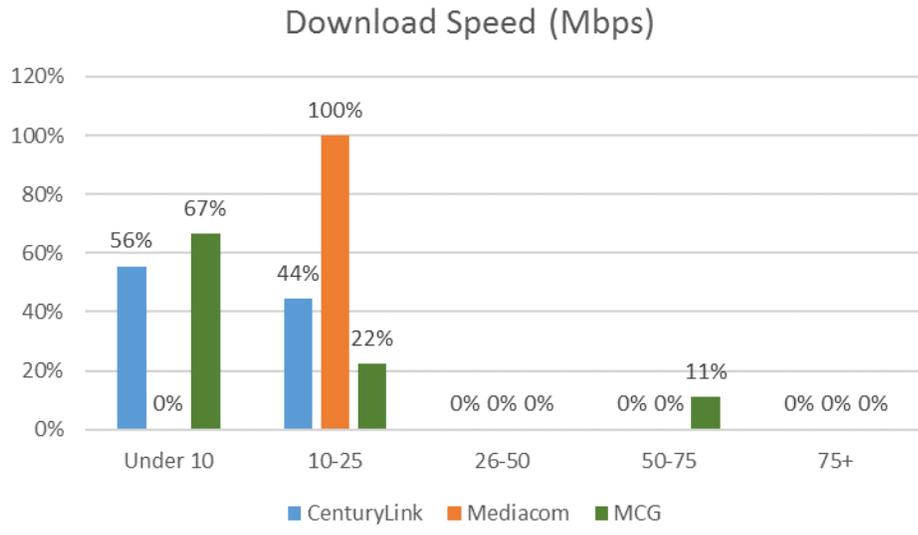
**V. What do you currently pay for your Internet service per month?**



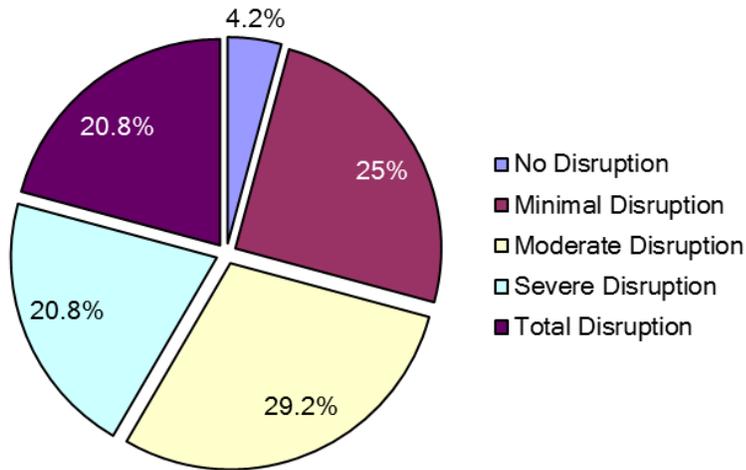
**VI. Which services do you subscribe to with your current provider?**



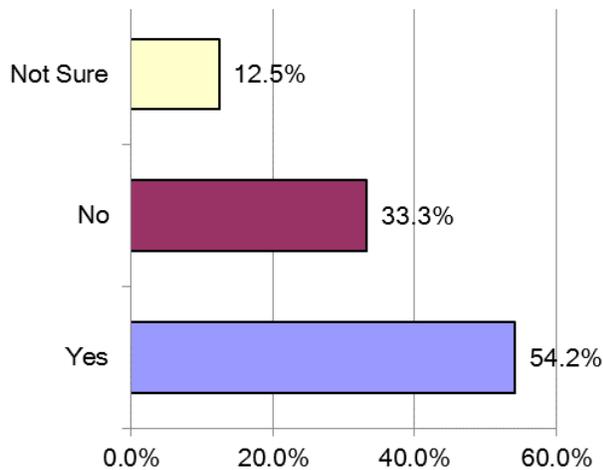
## VII. Current provider average download and upload speeds?



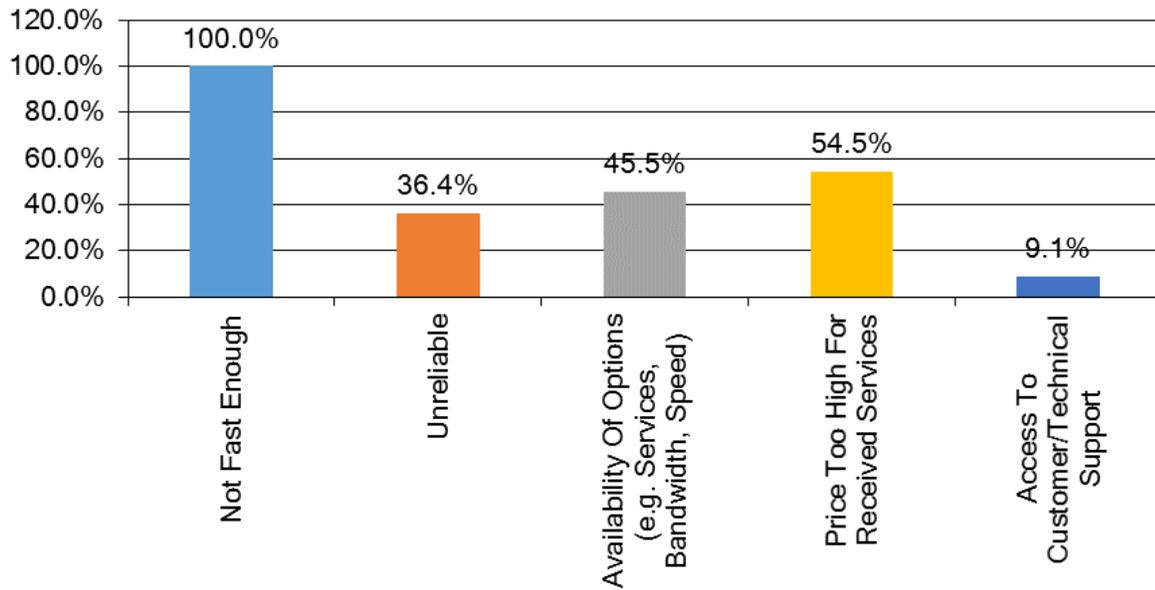
**VIII. What kind of impact do Internet problems (e.g. reliability, speed, support) have on your business?**



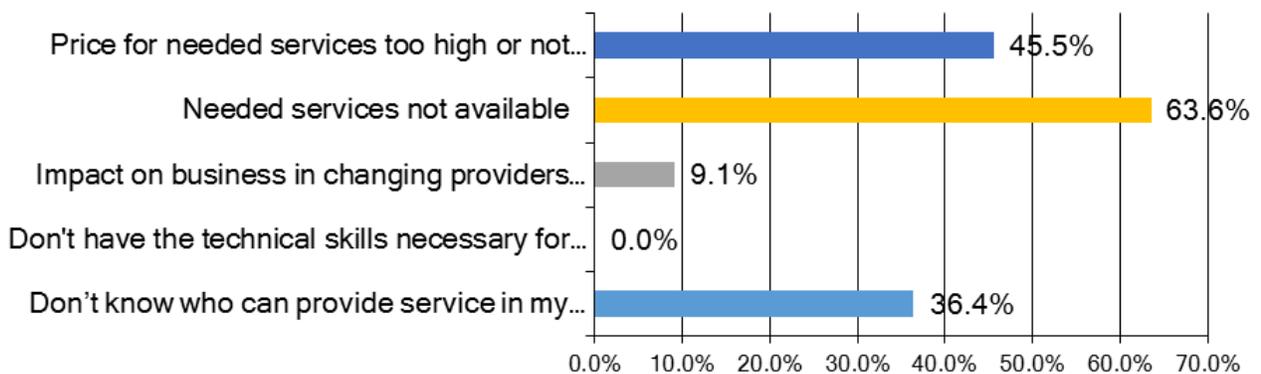
**IX. Are your current Internet services fulfilling all of your business needs?**



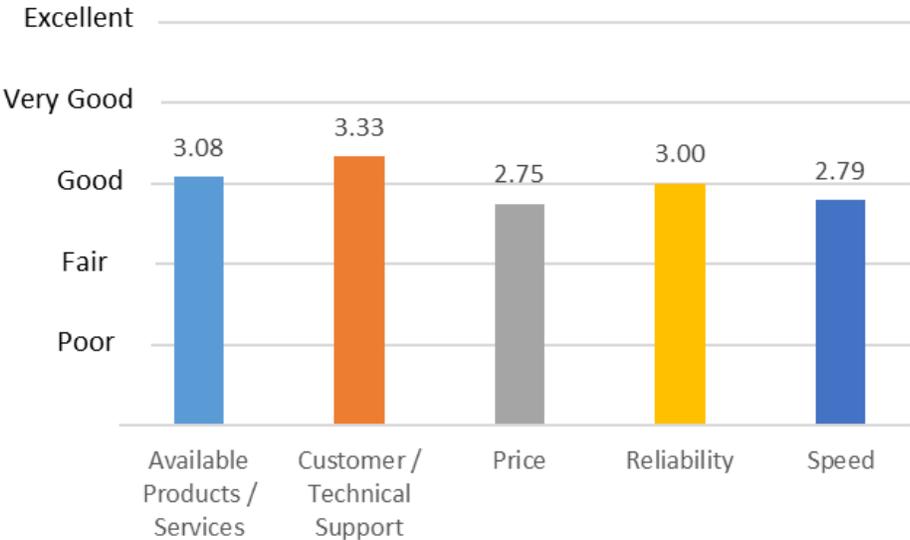
## X. In what way is your Internet insufficient?



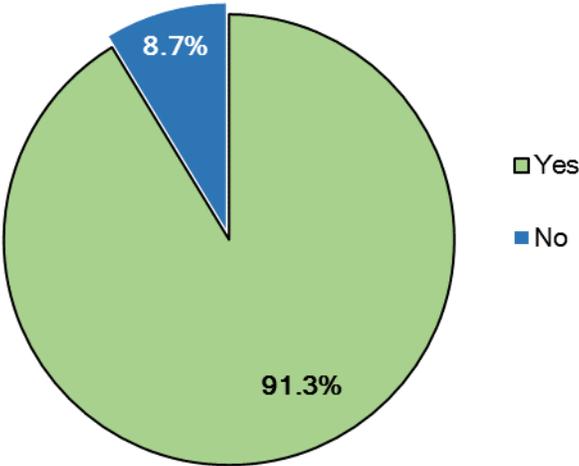
## XI. What is preventing you from upgrading your Internet services?



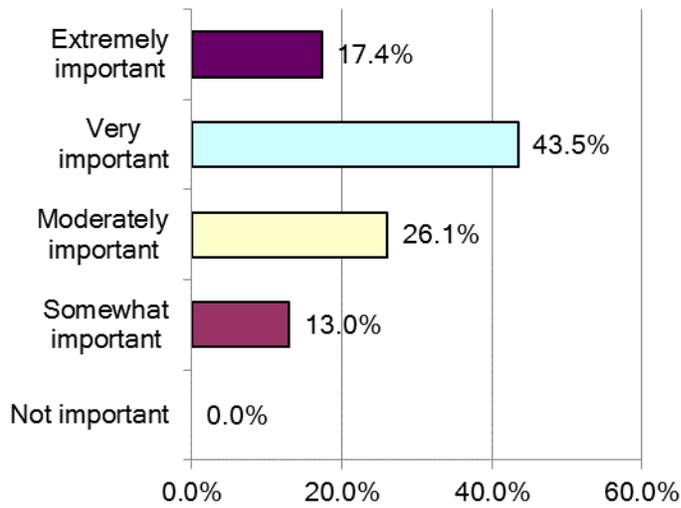
**XII. Please rate your current Internet services**



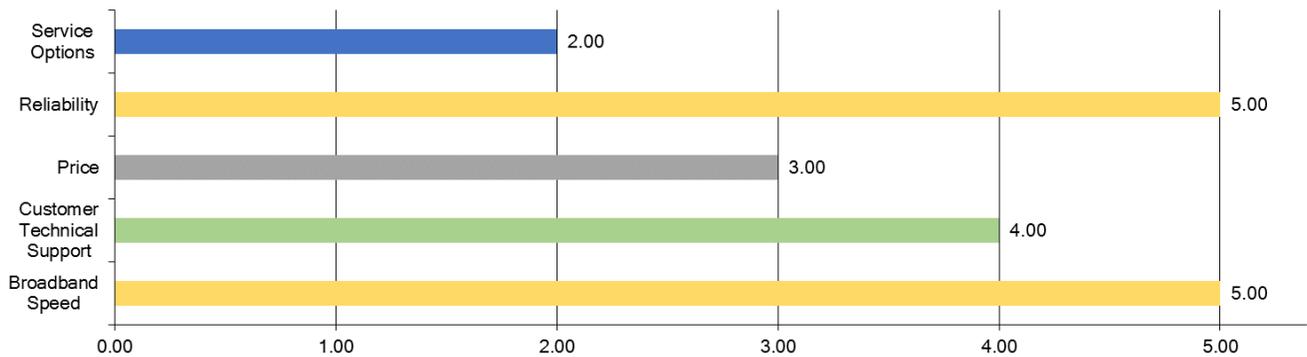
**XIII. Do you view high-speed Internet access as an essential service, like water and electric utility service?**



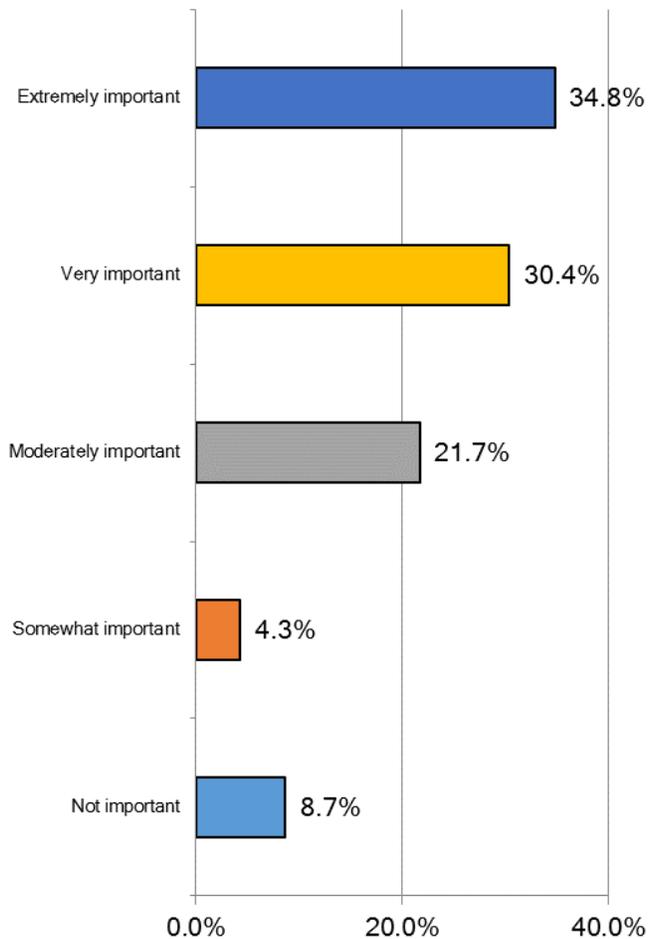
**XIV. Having multiple choices of Internet and broadband providers for my business is:**



**XV. Rank the following factors in order of importance when selecting an internet provider**



**XVI. If contemplating whether to relocate to an area or expand your current business, how important is having fiber-based high speed Internet?**



**XVII. Individual Business Comments**

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"Indianola needs a fiber-based high speed internet service as soon as possible."

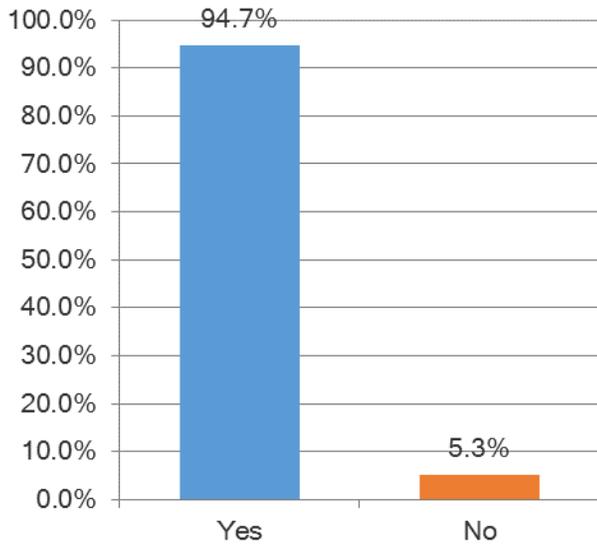
---

"We would love to have more options, especially reliable and affordable options for internet/phone/cable services."

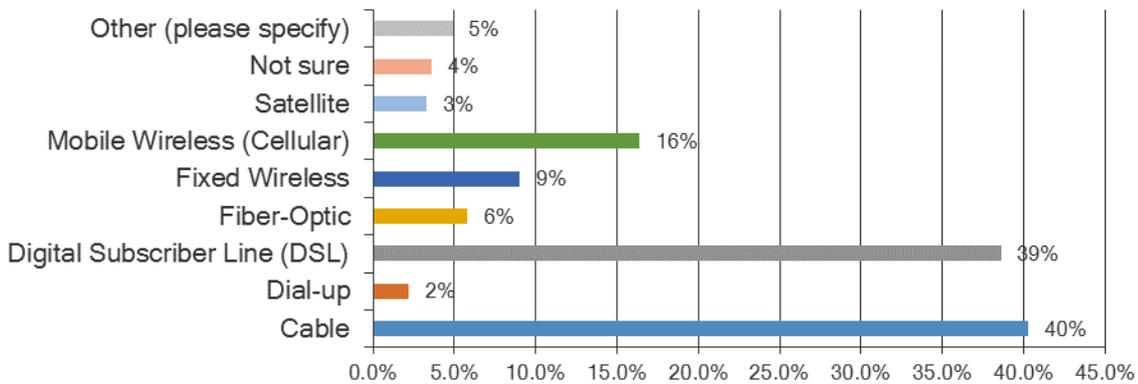
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# Appendix C - Residential Survey Results

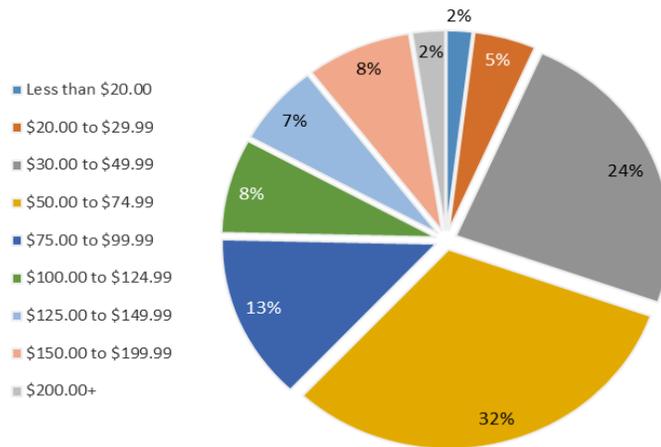
## I. Do you currently have Internet service?



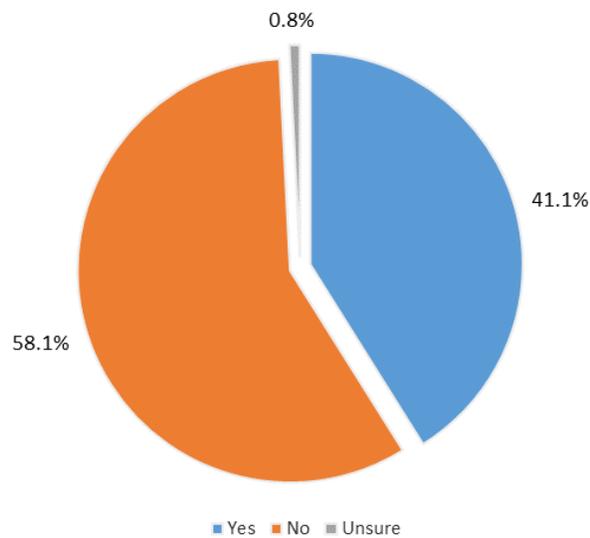
## II. What type of Internet service do you have at your business?



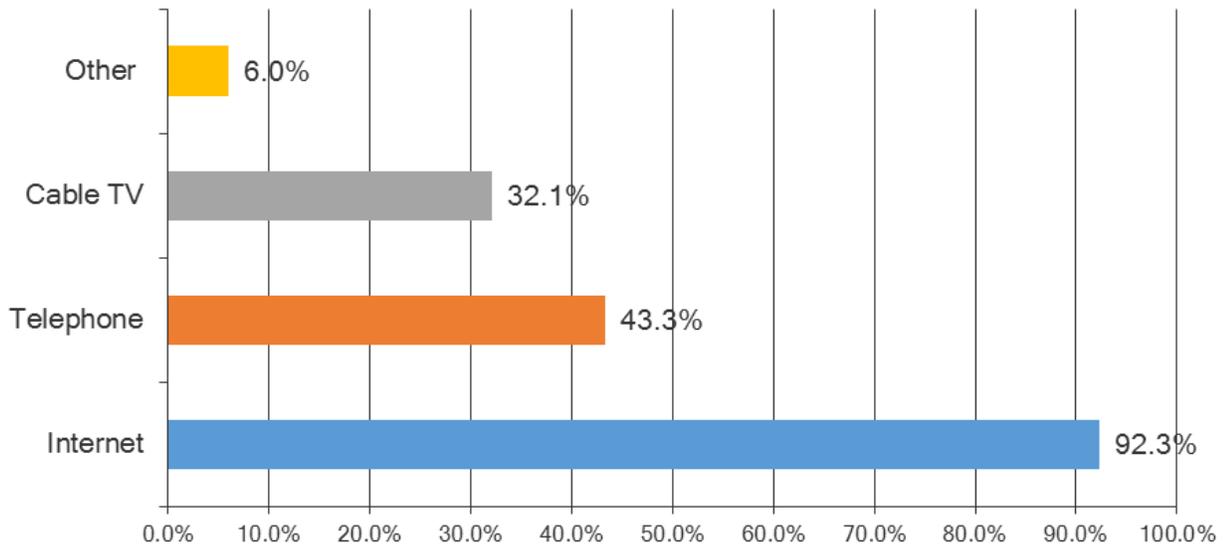
### III. What do you currently pay for your Internet service per month?



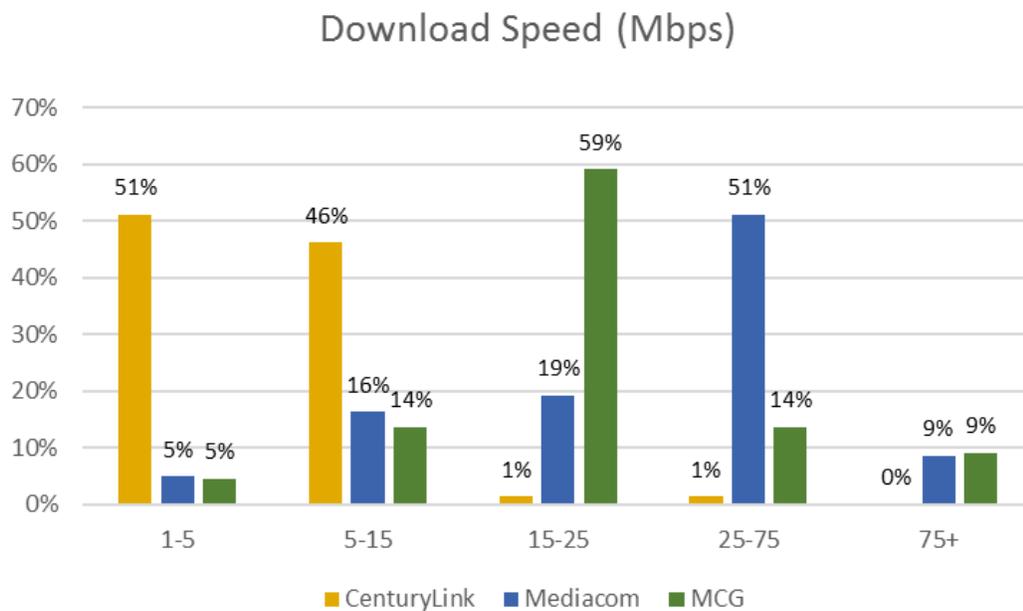
### IV. Does that cost include services in addition to your Internet connection such as television, telephone, etc.?



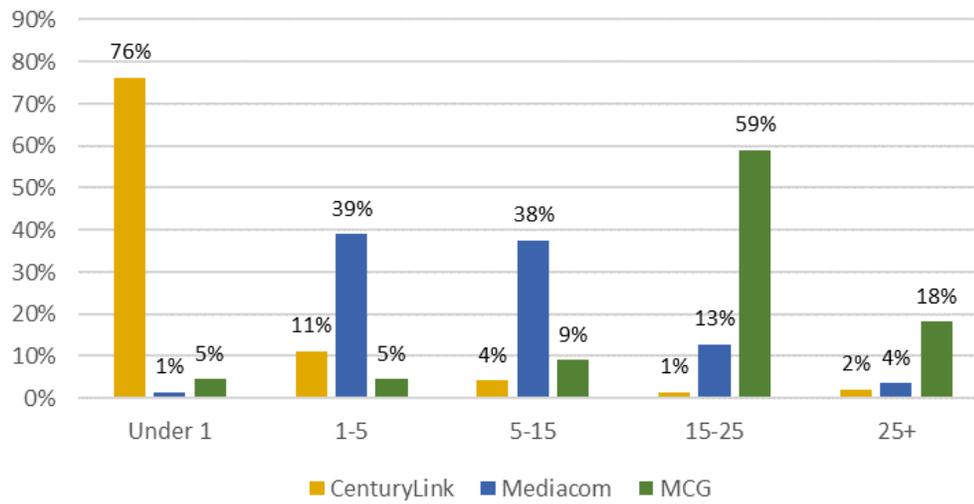
## V. Which services do you subscribe to with your current provider?



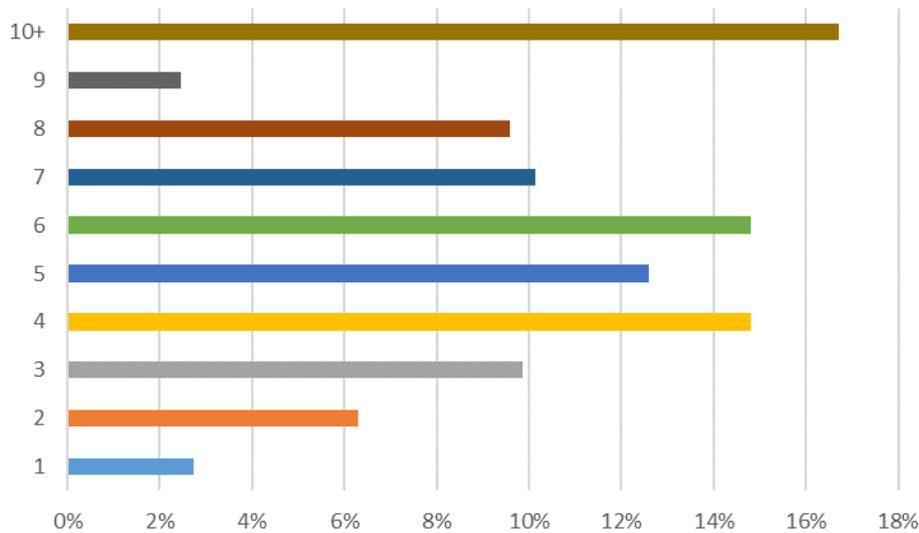
## VI. Current provider average download and upload speeds?



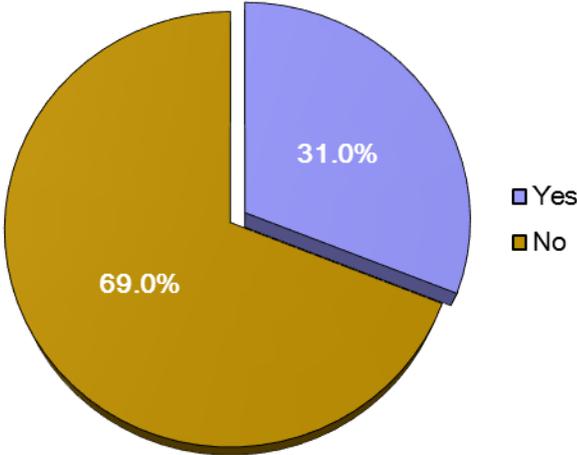
## Upload Speed (Mbps)



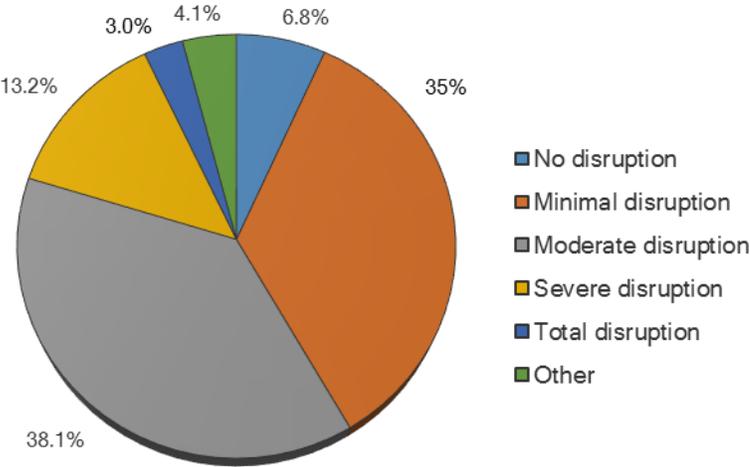
## VII. How many devices do you have in your home that connect to the Internet?



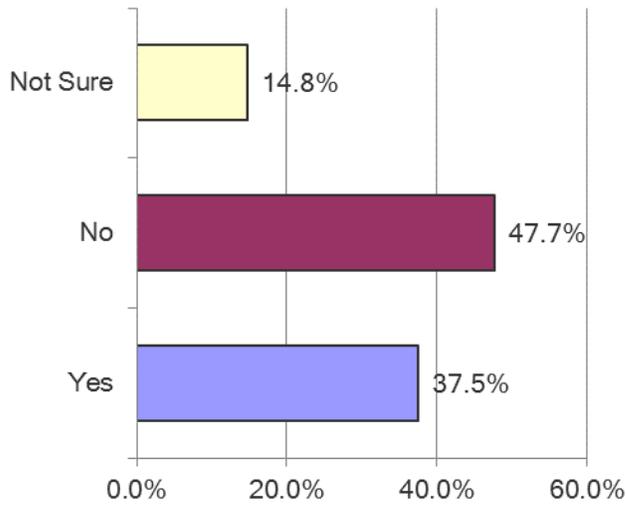
**VIII. Do you or any members of your household telecommute?**



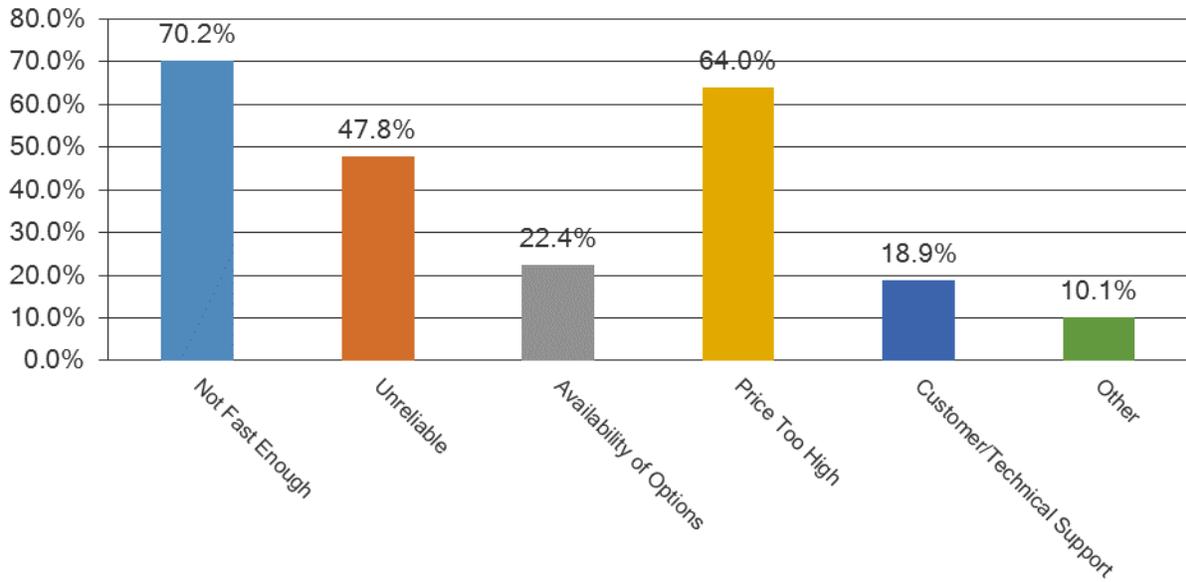
**IX. Impact of Internet problems (e.g. reliability, speed, support)?**



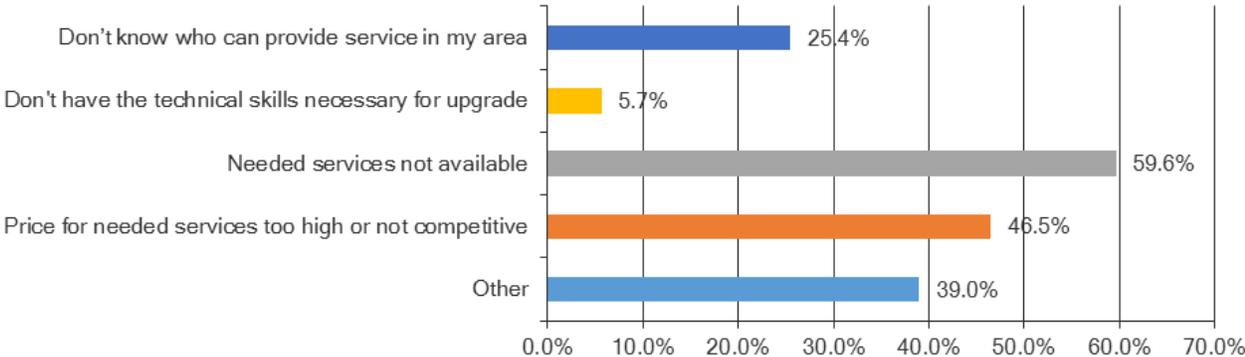
**X. Are your current Internet services fulfilling all of your needs?**



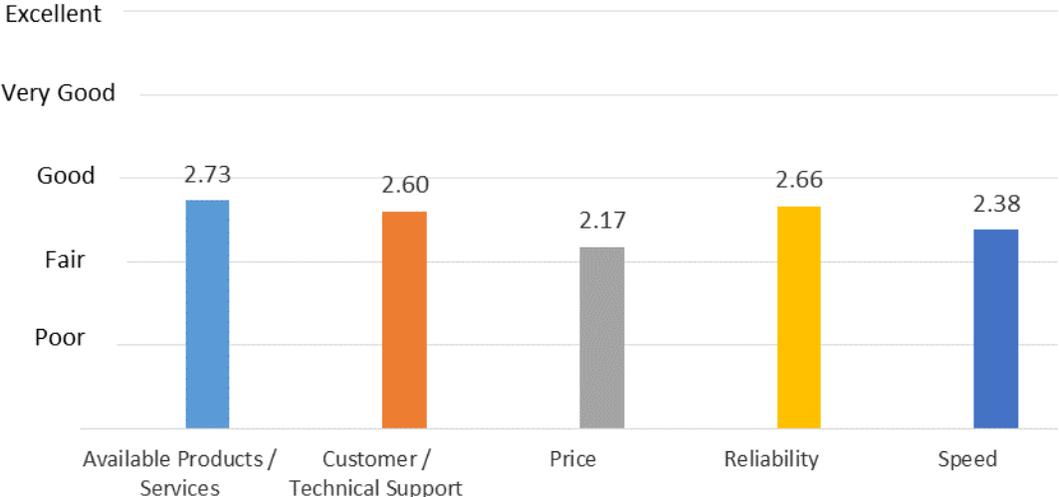
**XI. In what way is your Internet insufficient?**



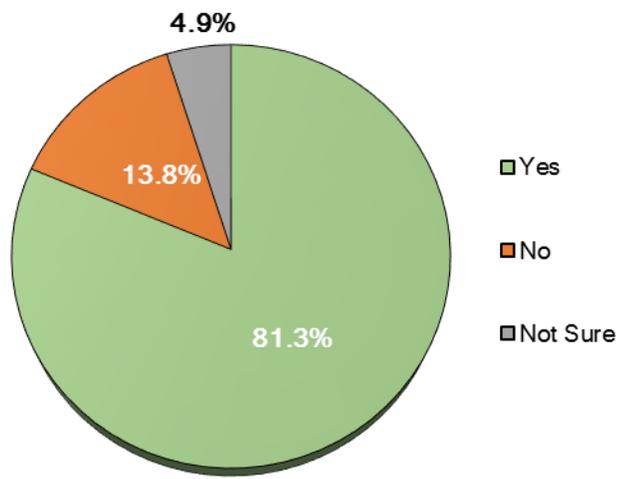
## XII. What is preventing you from upgrading your Internet services?



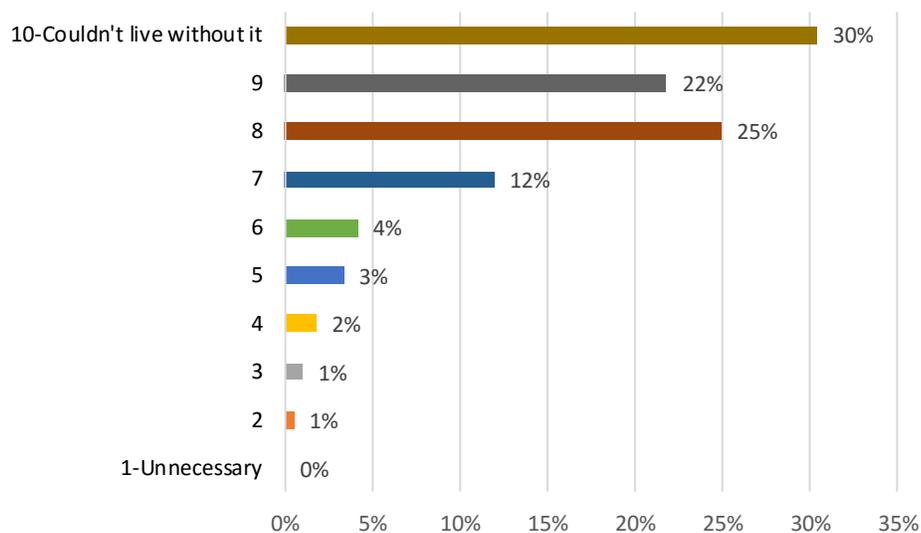
## XIII. Please rate your current Internet services



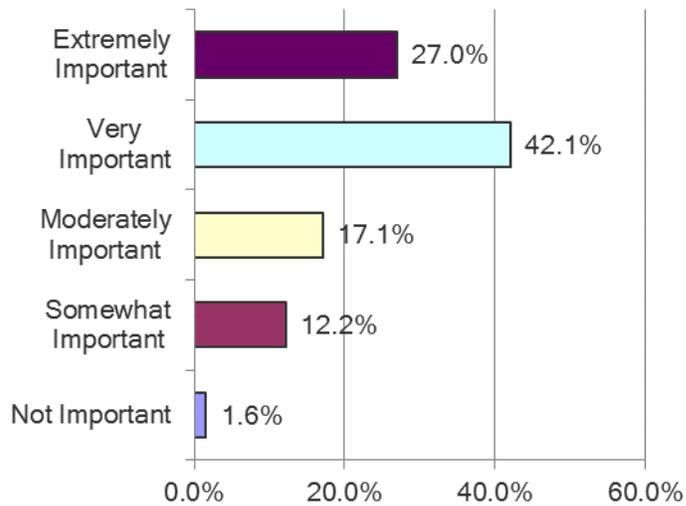
**XIV. Do you view high-speed Internet access as an essential service, like water and electric utility service?**



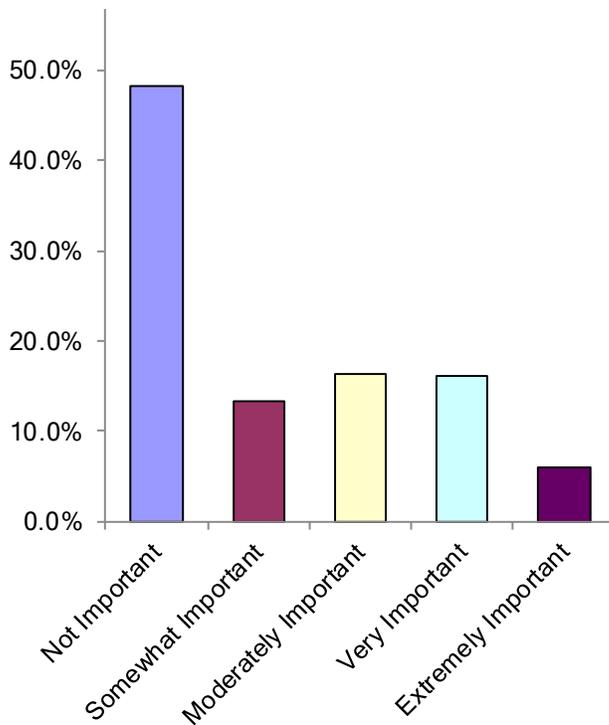
**XV. Do you view high-speed Internet access as an essential service, like water and electric utility service?**



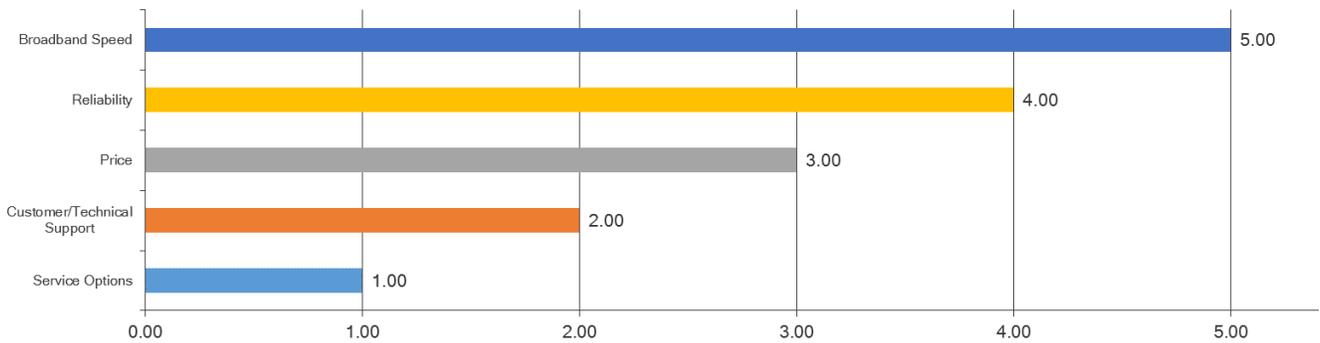
**XVI. Having multiple choices of Internet and broadband providers for my business is:**



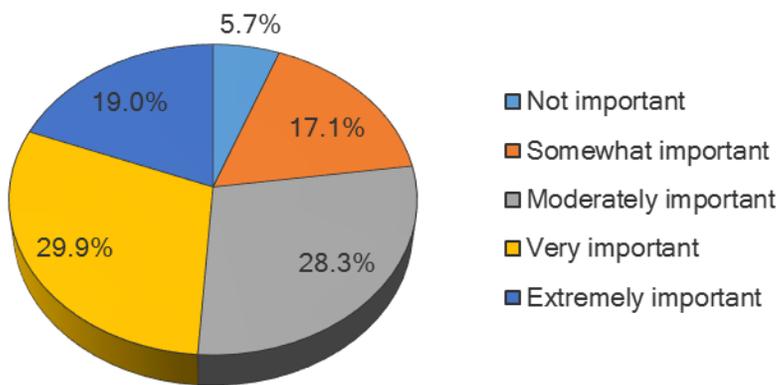
**XVII. How important is having a "triple-play" (Internet, telephone, and television) offering?**



**XVIII. Rank the following factors in order of importance when selecting an internet provider**



**XIX. When selecting a community or neighborhood for your residence, how important is having fiber-based high speed Internet?**



## XX. Individual Residential Comments

---

"Been waiting for too long, let's get it together."

---

"Better choices"

---

"CenturyLink does a decent job of meeting our needs. We do have some buffering issues at times."

---

"changing to another provider is difficult because of all the things you have to go through, changing addresses, contract being paid off, taking back gear, and so on. for me to change providers it would have to be very smooth with little problems."

---

"complete reliability that is affordable"

---

"Cost for high speed service is just too high."

---

"cost too much...would like city cable"

---

"Current service is not up to date and assistance from the provider is accompanied by additional charges. The city has the capability of providing these services and it is time to make these services available to all residents of Indianola. The practice of providing the fiber-optic service to some areas of town and not others is discriminatory as we all pay city taxes. Water and sewer are not provided to only some areas of the community."

---

"Currently when calling Mediacom they have me reset my boxes,, if I wanted to be my own tech I wouldn't need to call."

---

"Currently where we live we only have one option to choose from Centurylink for internet and phone service and Satellite TV for television. It would be nice to have an option to choose from and having a fiber network would be even better."

---

"Deer Creek in Indianola has no Internet options currently available. I would have reconsidered building a house in this location had I known this before. I am told by Century link customer services representatives that they will not allow new users due to the size of cable currently installed through the neighborhood. New users would degrade the quality of current users on that same cable. Century Link internet is low quality and slow, so even they could provide internet to my residents (which they currently can not) the quality is not adequate for my needs. My personal business requires me to stay well connected 7 days a week, nights, weekends and holidays. Cell phone coverage is also weak in the area, making personal "hot spots" unreliable and slow. There simply is not an option for internet in this location and it needs to be address for the sake of current home owners in the area and potential new home who may plan to build."

---

"Download speed is barely serviceable while Upload speed is abysmal for 2016 on DSL . Switching to cable is not an option because they now implement data limits and overage charges. I refuse to switch to data capped service due to Telecommuting. I will be the first to sign up for fiber if you bring it down my street. I've been checking availability for 2 years."

---

"Essentially dealing with a monopoly in many places right now, including Indianola (where fiber is not yet available). There are options, but they are not equivalent in terms of speed or price."

---

"establishing fiber in Indianola would provide a compelling competitive advantage to our slowly growing community. I believe that we are on the brink of real growth. Having access to fiber at fair pricing not only would spur residential growth, but put us on the map for commercial and employers to relocate to our community. The future demand for internet speed is infinite."

---

"existing customer rates always go up, yet new customers get a substantial price break"

---

"Fiber access is a necessity because mediacom and century link are completely unresponsive and provide no service to our town. I bought a brand new 275k house and have internet speeds from 15 years ago. Indianola could be a model community in the metro if fiber was in newer neighborhoods that families are moving into."

---

"Fiber based internet service availability is important and if we have it in our area we want it. Although it needs to be priced reasonably. Current internet through Mediacom fluctuates in strength of signal so frequently its hard to use."

---

"Fiber is across the street , please bring it to my home."

---

"Have been capped at <3mb service since been in Indianola. Would not consider opening/moving a business here that required any level of internet connectivity. "

---

"Having being stuck with dial up or tethering off cell phones until satellite became available (price & speed wise 3 years ago. Optic would be most beneficial now"

---

"Having cable service is the most important service. Mediacom provides us with everything we need."

---

"having reliable service with download/upload speeds as fast as possible is very important as my telecommute job is primarily that of moving large data files to the home office to be processed for customers. My internet speed and down time greatly impacts my ability to fulfill my obligations to my employer."

---

"How reliable is non-fiber-based internet?"

---

"I am a new resident to Indianola and did not realize internet service was so terrible where I purchased my home. Recently found out that the only service available in my neighborhood is Centurylink but they are not taking on new customers because it would degrade the service of others in the area."

---

"I am a realtor and this is very important to buyers. we have new homes that people will not buy because they have no services or very little."

---

"I can't wait to get fiber hook-up at our house!!"

---

"I chose Mediacom because CenturyLink didn't offer a fast enough speed. Neither of the services are anything I like to brag about to anyone. I would LOVE to have the Mahaska Fiber Optics service available in my area but it's not here. I've heard great things about this service and wish it would make its way to the northwest corner of town sooner rather than later. (but I've heard it's not even being talked about) :-("

---

"I do not like the service mediacom provides, but I have to use them as they provide the bandwidth I need. I would much prefer the fiber option."

---

"I do not want to give up my home phone/land line, so I feel stuck with CenturyLink, but they have provided good tech support."

---

"I do wish we had more options and especially faster, less expensive options."

---

"I don't believe that this service should be done by IMU but should be left to the Mediacoms and Quests of the world."

---

"I don't need much to connect to the things I need to connect to. If I had WiFi service I could afford then I would have all I need."

---

"I don't want to have to bundle to get a decent price. I only want internet, not phone, not TV."

---

"I feel the city of Indianola is ignoring residents communication need. Currently Mediacom is the ONLY option in my neighborhood as a provider of internet service."

---

"I feel we have a situation where there can too easily be a failure in our connection process. We started with a phone line connection, then made a hole in our wall for an upstairs broadband delivery. After they went out of business that was no good. Then there was AT&T and now Century Link which hooks into telephone wire that tends to be erratic at times and we rehook the modem to regain connection. The serviceman for Century Link said that the repairs to the line upstairs in our home could be ok for awhile or fail at anytime."

---

"I have not had any problems with my current provider , until things change ,pricing, service, my needs for speed , I would not change"

---

"I hope Indianola continues to expand the broadband fiber system"

---

"I hope that IMU will offer high-speed internet with reliable service at a good price very soon. Thanks."

---

"I live on the east side of town where they said that MCG is available. Well that is a lie. There service stops one street from me and the date they think I could even remotely have fiber is 2022. I have heard nothing but good things about this company in how they treat people and the cost but I would love to have them and they are not on my street. Why don't you have them totally finish in area before saying that is complete. For what I pay in taxes and utilities I feel like if my backyard neighbor can have fiber then my street should as well. I do not like paying as much as I am for internet and cable that provides nothing but awful customer service."

---

"I love Mahaska Communications Group."

---

"I love my MCG service. I was the first residential customer in Indianola, and I have recommended to many. If/when we move, I want this service to be available to me."

---

"I love that you are considering putting in the fiber-optic infrastructure in Indianola. There are only 2 other options for high speed internet in town, and neither one is very good. It is also a feature worth using to draw people and businesses to Indianola, the fact that there is Good internet in town. I am all for it!! Thanks"

---

"I moved to this neighborhood not even thinking that the internet service would be so inadequate. I really hope this issue is addressed very soon."

---

"I recently toured The Village. I won't move there because they have Mediacom."

---

"I think there should be multiple companies from which to choose cable, Internet, and telephone. As it is, I have only one option (Mediacom) and I think it is overpriced."

---

"i work from home so fiber was my number one choice. The service reliability is a bit off compared to other fiber services I have had but will take that over the other choices in a small town any day! Kudos for getting Fiber into Indianola!"

---

"I would be nice to have a local supplier."

---

"I would change my service to any high speed provider that offered service to our neighborhood, and would be very loyal provided that price and reliability were good."

---

"I would like to get something cheeper"

---

"I would like to see indianola fiber network expanded to my neighborhood"

---

"I would love to have another option for high speed internet. Centurylink cant seem to upgrade this neighborhood and Mediacom may be too high priced once the promotional period runs out"

---

"I would much rather get Internet service through my local municipal utility. I am not confident that with any commercial providers that we are getting fair pricing, and based on the test we are clearly not getting what we are paying for now. We lived in Osage at the time the utility began to provide cable, broadband and phone service and it was the best we have ever had--good value for what we paid and the blessing of having excellent local service."

---

"I would much rather give money to a local internet company than a big conglomerate."

---

"I would pay more to support my community."

---

"I would purchase your services as soon as they are available in my neighborhood."

---

"I would say that present service meets our needs, I mike like to have faster service but I would not be interested in paying much more than I am now paying to receive it. I think that what we have now is plenty expensive."

---

"I would sign-up for fiber-based high speed internet if it were in the price range that we are currently paying 49.95. I would also use the service for TV and phone if prices were competitive with what we are currently paying."

---

"I would switch to IMU/Mahaska high speed internet in a heartbeat. I hope the survey illustrates that IMU can roll the service out to the entire city. I know it is expensive, but would really be a welcome addition to the city."

---

"I would very much like to have the option of the Mahaska County services available in my area."

---

"I'd really like to get fiber to our house."

---

"Ideally, we would like to have internet/phone/TV services bundled, but we don't want to lose our home phone number. We would then like internet separate, or internet/TV bundled."

---

"If the City had service in my neighborhood I would support it."

---

"If we could get a standard base price without all of these pricing games would be better."

---

"Ignore download/upload speed data.....we are currently located in Long Key FL"

---

"I'll reiterate - if Indianola offered fiber broadband in my area, I'd pay for premium residential service."

---

"I'm in a new neighborhood and the better high speed service is not available. With multiple devices it isn't working very well."

---

"I'm on a family phone plan. I do not want cable."

---

"I'm waiting for IMU to service my area."

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"In 2011, had we realized how fully dependent on the internet our lives would be today in 2016 we would have given thought to this as a criteria on our home building checklist. Sad to say, we wouldn't have built our home in Indianola. Unfortunate for Indianola, the current and future generations of homeowners do and will have the insight to research the availability of such data service when choosing the location to build or purchase. The internet is no longer an optional luxury or entertainment or convenience for the vast majority of people. Children depend on it for their studies and education while parents depend on it for their professional livelihood (i.e. work from home professions). Indianola cannot afford to sit back and wait any longer. The future prosperity of the community desperately needs this project to move forward without delay."

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"In Indianola the only option is Mediacom. I was told that if I went with Quest the only speed they could offer me would be equivalent to dialup. So we have to pay Mediacom what ever they want to charge or do without internet."

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"In reference to question 24...I probably would not have made my home in Indianola had I known at the time how far behind the curve the city was. It affects those who telecommute and/or have businesses out of their home a great deal. So much so that I simply decide to drive to DSM so that I can be more efficient and have good internet service."

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"In the past I have had cable, and satellite services, and the fiber connection is the best by far."

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"Indianola seems to be lagging behind much of the world in internet options and speed. Can't interact with internet the way I would like. Big downloads take too long, upload next to impossible, hard to use online applications that are desktop replacements."

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"Install more fiber"

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"It would be great to have service through the municipal utility."

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"I've had both Mediacom (19 years) and MCG (2 months) and liked both of them. I would love to have either for an option right now!"

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"Low cost and reliable Internet, tv and phone service would be a real attraction for people and businesses moving to Indianola."

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"Mediacom has not proven to be customer focused and charges outrageous prices for services, but with Centurylink not really an alternative due to limited availability, it's what we're stuck with. One thing that

will need to be thought about if IMU starts providing internet service - capping the internet usage is proving to be a huge problem. Streaming is rapidly becoming indispensable, all internet providers will need to address this issue and plan for what usage will look like in the future, not as it stands today."

"Mediacom is the best we can get until fiber is installed in our area, so please hurry up and do so!!"

"Mediacom is the only choice we have, any service that comes through the phone line has been unable to provide us with any higher speed options. The main problem with Mediacom is the number of times we lose internet service for periods of time and sometimes phone service as well."

"MediaCom is too expensive. Century Link is too slow. Options are minimal in Indianola."

"Most issues regarding internet stem from connectivity issues and lack of variety of feasible choices between providers. Mediacom and Mahaska are the only providers that offer middling speeds for beyond the price that their worth. Landline and cable bundling options are becoming obsolete as todays younger consumers are opting out of cable and landline services."

"My aunt and uncle have service threw imu and love it love the price as well. This really would be nice in town just for another choice for people the price may be a real big incentive for the community. I really hope that you consider expanding the service."

"My experience with Mediacom has not been very good, however since they are the only provider of the high speed internet I require I am stuck with them. I would very much like to find someone with the high speed I need and who are more reliable and responsive."

"My husband and I are both online college students and we homeschool our kids so having reliable internet access is very important for all of our education needs."

"My internet service is fine. The fiber network that Indianola setup years ago should already be available to all residents. I've been VERY disappointing in IMU for not making fiber access to the entire town a LONG time ago!"

"My kids need Internet for school and I run two businesses out of my home. My husband is working towards his masters degree and needs the internet as well! Not having quality affordable Internet is a huge stressor."

"need fiber optics on West Iowa Ave."

"Need more options since speeds greater than 5mps are not available or rto get the best price you have to have telephone and/or TV service. Most people use cell phones and not landline."

"Need more options that are available"

"On question 24, I'm not really in search of new housing but if I were it would definitely be a factor."

"One should be able to get a good combo package even when limited by income. I haven't seen network television since June '09. Internet speeds go up & are assumed available for all...but not for low income. Loyalty means much less, price is rising...not our quality of lifestyle. Local access is a priority coupled with price, product value & service."

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"Our DSL is on the end of an old phone line that we can talk to our neighbors by lifting the receiver when it has rained a lot. If one of us is using our phone, the other can join in without dialing out. And that line carries our DSL."

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"Our family moved here last June and picked to live in Indianola over many other communities. We love it here and look forward to having high speed internet available on our street."

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"Our family was very surprised that our neighborhood had little to no options for internet service. Extremely pleased that you are looking into this."

---

"Our new neighborhood is out of options for the internet. We all have families that use the internet daily. Our kids need the internet for their school work. If I knew that our neighborhood didn't have any internet options and didn't have fiber optics installed, I wouldn't have moved here. This needs to be fixed as we are out of options. Some families here have to go without any basic internet services. Is there anything the city of Indianola can do to help Mediacom consider offering their services to our neighborhood? Thanks"

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"Our only option is Centurylink. We would love to have more and faster options."

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"Past plans for improving internet service in Indianola have paid little attention to demographics of which neighborhoods would have a higher potential for density of residents who would contract for service."

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"Please build out a city wide fiber network immediately. I will support any options for funding the project."

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"Please expand MCG. Mediacom and centurylink are terrible."

---

"Please expand services to our area. We would have selected a different location to build our house had we known we would not have better internet service available."

---

"Please give us an option! MediCom is evil!"

---

"Please hurry up and do this as current providers are inadequate."

---

"Please make this happen"

---

"Please rescue us from Mediacom!"

---

"Please work a soli Union Please work a solution that would allow indianola customers to have high speed internet Please"

---

"Ready for a change"

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"Right now, the only real options for my location are Mediacom, satellite, or mobile (Verizon, AT&T, etc). Mediacom is the best offering, because it offers true high speed internet with a reasonable data cap. The others do not have anything near the speeds, and generally max out at under 100gb usage. I do telecommute from time to time, and also need the ability to provide support at any hour of the day. Because of this, reliable internet access is a big deal for me."

---

"Seems like prices just keep going up, and there is no competition to keep them reasonable"

---

"Send me information as to what the prices will be and when it will be offered,"

---

"Seriously need to connect MCG ASAP to my house. If Google comes first you will go out of business."

---

"Should not cost an arm and a leg."

---

"so far doing very well have no complaints"

---

"Sometimes I feel like I'm sharing my Internet service ."

---

"Speed goes down quite a bit at night with DSL when families are streaming video. Would like a more reliable and faster option."

---

"The bill is hard to read! So many surcharges etc that it is really difficult to know what I'm paying for internet vs tv. It is unbelievable what we are paying!"

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"The city of Indianola should require all providers to service all residents in the city limits. We have only one choice for providers. We live in a new development that is not being serviced by other providers in town."

---

"The equipment that is rented out by mediacom is junk. The service is 100% UNRELIABLE. The technicians don't know what they are doing, and mediacom is not willing to reimburse for issues with their equipment or service."

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"The lowest connection speeds are typically seen during peak usage times. For example, in my household, a typical connection speed of 25 Mbps can easily drop to 1 Mbps during these times."

---

"The speeds were so slow today it took me 20 min to fill this out and came close to giving up on filling this out. If we the speeds get any worse we will have to look at moving out of Indianola to a community that has better internet. We live in a new house in a new subdivision of houses that are 300K or higher we should have better access. If the city wants to attract people in this income level and property tax level they will have to step up the basic services like high speed internet. We moved here 5 years ago from Ankeny and if it was not for the good schools we would have moved out of Indianola a year ago when we purchased our new house. We also have a farming operation that I do the marketing out of our house in town and internet speed has been an issue with doing what I need to do for my farm on the internet also."

---

"There is certainly not enough competition in Indianola. If we could get fiber, that would be great."

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"There need to be other options available!!! Please extend into our neighborhood."

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"This option is a huge selling point for bringing businesses and new residents into our community, and staying competitive with other metro communities. As a former chamber board member, this service was something we were able to utilize when speaking about the benefits of living and working in Indianola."

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"Very frustrated that the MCG plan never did materialize for my neighborhood! I understand that since our lines were buried long ago, that is the reason why we would be last to get the new lines to enable our internet capability. Seems ridiculous to me. This program seems to have been a farce, with it stalling after all these years since introducing it. A very ill-conceived idea."

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"Was told by Century Link that 4 Mgb was all I could get here in Indianola. I have neighbors with 7 Mgb for same provider, when I pointed that out to Century Link was told I couldn't have more that 4 regardless of price, it just wasn't available - really now! What's the issue ....."

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"We actually chose our home location based on whether or not high speed internet was available in this area. We have many friends in Indianola who are disappointed that they don't have the option of the higher speed internet, and some locations within the city limits where Mediacom is not available and the IMU high speed has not reached them yet. We are jealous of those who have the MCG service and keeping checking on the availability to us, but it's not scheduled as part of the conversion just yet."

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"We are in a brand new neighborhood and pay one of the higher tax rates in Indianola but we probably have the worst internet options in the City. We don't even have Mediacom. I see the businesses around us getting fiber but not us. I need this for work and if it doesn't happen soon we are moving. The amount of taxes we pay I am sure will be accepted by another city. - Matt Bjork"

---

"We are pleased with MCG and speaking to a real person, right here in Iowa, for any questions is definitely a plus."

---

"We built a new home 2 years ago on a paved street in town. Once we moved in were shocked to learn that our only option for internet is 1.5 Mbps and we have no option for cable TV. We now have 18 new homes in our neighborhood and nothing has changed. In fact the newest homes are not being allowed on the network due to too many homes online, so they have ZERO options for internet."

---

"We definitely need some additional competition. Mediacom forces its long term customers to pay punitive high rates to subsidize newcomers. If the Dish or Direct TV or Century link could provide high speeds sufficient for streaming movies to my smart TV, I would switch. They don't in my section of town. If Mahaska or the city provide a suitably priced product I will definitely subscribe. If I have to get TV from somebody else, so be it. I can always drop my land line. I only keep it because the price is fixed by Mediacom and supposedly will never go up. So far, that has been the case. It is only \$30 a month, but my total bill is \$252.57 a month. I call them every six months to get an adjustment, but it usually small and doesn't last long. We have outages and need outdoor and indoor replacements frequently. The trunk lines they are using were put in over 25 years ago. Thank you."

---

"We did have CenturyLink for phone & internet, but the internet was EXTREMELY SLOW....had to change cause they could not get anything faster to my house. Mediacom is/was my only other viable option. Currently have Directv for TV, but would like to change to MCG if/when they get to the west side of town (north of Wilder)!"

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"We do not care about cable TV. We require a hardline telephone. We like wired Internet service into the home where we can use a wireless modem. We do not believe satellite dish is completely reliable in bad weather. We don't want a dish on a roof. We don't use smartphones, I-pads, tablets, or Internet radio and music options."

---

"We do not have any desire to have broadband. We moved here from a community that forced it on us and it was terrible. DO NOT WANT IT!"

---

"We feel we need to have this service available as we have had in another area of Indianola where we had used it for the past 15 years."

---

"We had CentryLink and then switched to MCG. However, our new house will only have CentryLink again and I'm not very excited. I have a feeling I won't be able to work from home with it."

---

"We have been pleased with MCG since we switched (from Mediacom - very dissatisfied). We don't need TV or a land line."

---

"We have been unable to get internet service in our area except for a jet pack from Verizon and it is not very fast or reliable plus expensive. Indianola should be able to do better for their citizens."

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"We have had VERY frustrating and negative experiences with 3 different internet providers. I have MCG at my office. I have only positive wonderful things to say about their service and support. PLEASE let me have their service at my home. I know I will pay more but I also know I will be able to use it anytime I want. I do not have that freedom with Mediacom. I am tired of unreliable Internet."

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"We have the absolute slowest internet. Slower than dial-up. You can see by our results. It's a complete joke. We have to go to the office in downtown Indianola to get any service. We can't upgrade through CenturyLink due to outdated fiber optics in our area. I'm paying for a service I don't get. CenturyLink can do nothing about it but doesn't fix my bill for such slow internet speeds. Worst internet we've had in 15 years. PLEASE UPDATE FIBER OPTICS IN OUR AREA OF NW INDIANOLA. PLEASE!!!"

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"We lived in Cedar Falls, IA for years where the municipal utilities provided most all services and it was wonderful. Lights, power, water, garbage, recycling, internet, telephone, and cable. ON ONE BILL AND ONE PLACE TO GO IF PROBLEMS. Great if Indianola could do something to increase broadband speed and furnish the option to have it from the city. We would subscribe"

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"We moved in 2014 we were disappointed that we can't get any other internet company to come out here. MediaCom stopped at the top of the hill right before us. The city put fiber in right across the street? our neighborhood is almost complete and needs the better internet. I have contacted the city multiple times"

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"We moved to the Deer Creek neighborhood in late November 2015, which was only about a mile away from where we were living (McCord addition). When transferring utility services, I was shocked when Mediacom told me they didn't offer services in the area. We didn't even think of the internet issues we would have when only moving about a mile away. We connected with CenturyLink since we knew others in the neighborhood were with CenturyLink and 'tried' to establish service. We were set up and after about 4 weeks of no internet connection (promises of connection being made every other day when we'd call, including a rep claiming the line was severed underground and had to await repair) and extremely terrible customer service, we were told that we couldn't have CenturyLink service anyway. The rep wasn't sure why anyone had signed us up. They're out there, but connecting us would slow down an already very slow internet speed for everyone else connected to it - so that isn't an option for us. What we've done is set up a jet pack/hot spot with our Verizon cell phone service, but that isn't a viable option either due to the amount of data laptops, phones, etc. eat up when connected to it. To get the data we'd need, it would cost us well above \$100/month. As it is right now, we have a jet pack plan but rarely ever use the service since it's too cost prohibitive to go over our data allowance or increase to a higher plan. I did one iPhone backup and it ate up all of the monthly data and then some. The first month, my husband did some work on his laptop the night we got it and it ate up a quarter of the monthly data. As additional information, my husband is a real estate agent who needs the ability to work from home, which requires a high speed internet connection. I often work from home with my job, but am completely unable to now due to the fact we can't connect our desktop computer to a wireless hot spot signal (and even if we could, I couldn't do much online before our data would be exhausted for the month). So neither one of us are able to work from home, which is not anything that had crossed our mind when moving within the city limits. I know we're not the only ones facing this very frustrating situation in the Deer Creek neighborhood. There are many and it will only continue to grow until a high speed internet solution is implemented. A high speed internet option is imperative. Thanks for allowing us to provide input!"

---

"We need a better option on the West side of Indy! Please!"

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"We need to evolve here in central Iowa as larger markets are to stay competitive for telecommuters and general small business. 1G will be the new standard in major cities not long from now. We need something like that to attract business residents."

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"We now include a landline phone for \$10 more a month, but we rarely use it."

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"We obtained info about Mahaska broadband services when looking the last time but was not available in our neighborhood. We are very interested in having it available."

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"We only have one choice in the area where I live for high speed internet. Mediacom. We feel they are too expensive and would like to have another choice for our internet needs"

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"We really hope IMU finish the study successfully and start providing broadband to this fairly new neighborhood"

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"We recently moved and discovered CenturyLink and Mediacom do not offer internet service at our address. That left our only option as Satellite Internet. And to make it more affordable we then bundled that with satellite TV that we necessarily did not want. The opportunity to get fiberoptic internet and cable would be a great opportunity to save on costs"

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"We used to have Century Link for our Internet service and landline service. We had Medicom for cable service. We switched to MCG and absolutely love it! Would not even consider going back to other providers."

---

"We would love fiber based high speed internet in our neighborhood."

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"We would very much like to have Indianola Municipal Utilities provide internet, television and telephone service at our home. We have been with Qwest/CenturyLink for years and been unhappy for years. Combined costs for internet, TV and phone are much too high as well. Thanks"

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"We've been hearing about this for years. Is the west side of town ever going to get it??"

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"What is available to me is too slow"

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"When I moved to Indianola I wrongly thought that fiber Internet service was available in the townhouse I purchased"

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"When I started with Century Link it was much cheaper, but just like my Direct TV, after that initial welcome new customer time, the prices almost doubled. I am currently looking into changing plans. Do you have any idea when my neighborhood will be available for your services and what the prices are?"

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"When we built our house this last year in a newer development. Century Link was our only option and it is SUPER slow. I work from home for my full time job and my side business and it all uses the internet. I am a web designer. SO we would like a better/faster option ASAP :) Thanks!"

---

"When we moved to Indianola, we were in the Howard service area where fiber became available and LOVED it. Very pleased with the service. We are now just north of town by the YMCA and our only two options are century link 1.5 mbps or satellite where we pay \$160 per month for data capped internet. This has severely limited our desire to live in Indianola and one of the contributing factors to selling our house and moving. Internet is a public utility and everyone should have access at a reasonable cost. I work from home, telecommuting, and internet is absolutely critical for me to do my job. To be limited to the two

options we have now is ridiculous. I wholeheartedly support the city making this available across the entire region."

---

"Why is it taking so long to bring fiber optic to residential areas?"

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"With many companies in greater Des Moines area allowing people to work from home I think if you have high internet speeds and a good community I think you have the potential to get more people to move into the community. Which could also gain more business in town and jobs as well."

---

"With question 24, it's tricky, because the reality is that there are so few areas in town with fiber that I'd have to rate it as not important, but if it was more widely available, I'd weigh it as extremely important in a decision."

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"Would love to combine internet and TV. Probably not phone as we only have cell phones and are on a family plan with our out of state daughter. Very much look forward to what you could provide us on a six month basis as we do spend six months in Indianola and six months wintering in Texas. Thank for the opportunity to fill out this survey."

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"Would love to have economical, reliable, weather safe(buried fiber optic) fast internet."

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"Would rather purchase local but it is not offered in my neighborhood"

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"Would really love to have fiber available in our neighborhood. Definitely think it would be a huge addition to Indianola to have it across the community."

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**Meeting Date:** 07/18/2016

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**Information**

**Subject**

Consider Magellan Advisors Proposal for a Business Plan, Implementation Plan and Network Design

**Information**

Attached to this agenda item is the proposal from Magellan Advisors for the next steps which are developing a business plan, an implementation plan and the network design. This proposal may be accepted as a whole or Trustees may choose to select one or more individual services.

Note, the total estimate of \$380,760 has been injected into the feasibility study capital cost estimate. However, travel and incidental expenses for these next steps have not.

**Financial Impact**

N/A

**Staff Recommendation**

Simple motion is in order.

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**Attachments**

IMU Phase II Broadband Project Business Plan , Implementation Plan, and Network Design



# Proposal

## Phase II Broadband Project Business Plan, Implementation Plan, and Network Design

**Prepared For:**

**Rob Strangel  
Indianola Municipal Utilities**

**Prepared By:**

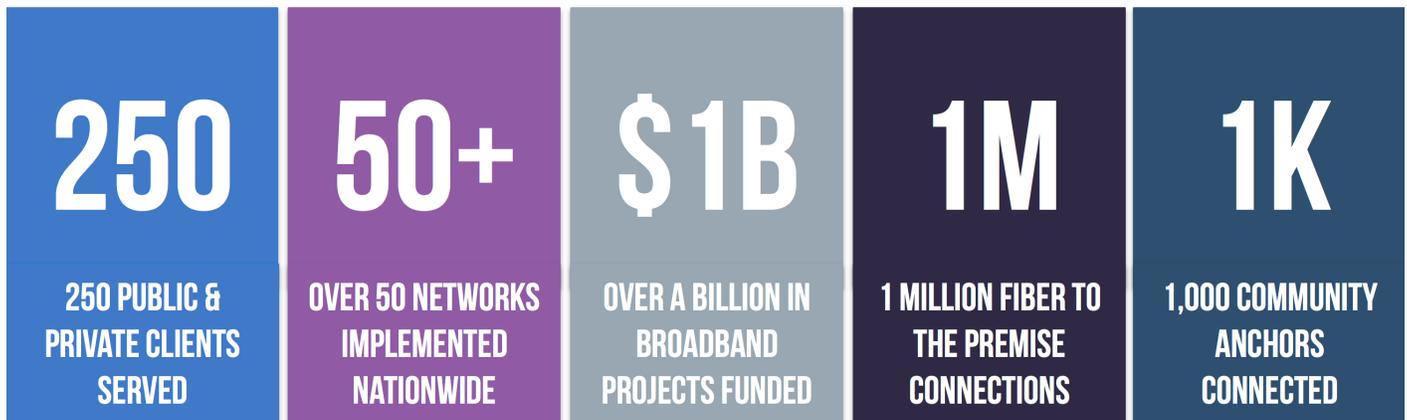
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Denver, CO 80202**

## Overview of Magellan Advisors

Magellan Advisors is the leading broadband consulting firm, providing broadband planning and implementation services for public utilities, government organizations and service providers across the United States and internationally. We assist providers, cities, counties, states and public utilities leverage their strengths to plan, deploy and manage fiber and wireless broadband networks, enabling their communities to thrive in the digital economy. We embrace the needs of communities to enhance economic development, improve education, expand healthcare and position themselves in the digital domain. We believe that broadband is a critical element to achieving these goals and our services position public and private organizations with effective strategies to expand broadband, customized to their individual needs.

## Proven Process. Proven Results.

**Magellan helps more communities achieve their broadband goals.**



Our combination of unmatched broadband, telecom, business and operational experience creates actionable strategies that communities use to realize their broadband objectives. We have lead the planning, funding, construction and management of over 50 fiber to the premise networks passing over 1 million homes and connecting more than 1,000 schools, hospitals, government offices and community organizations. Our work has resulted in over \$1 billion in new broadband investments nationwide. Magellan has helped more communities successfully plan, implement and manage gigabit broadband networks than any other firm in the market.

## Portfolio of Services

Magellan is the only firm that provides comprehensive broadband planning, implementation and project management services, enabling our clients with a turnkey consulting partner that helps them through every step of the process. Our project teams are comprised of professionals with significant operational experience in the broadband, public utility, local government and information technology sectors. Unlike many consulting firms, we have deep business and operational expertise planning, building and managing networks, skills that are paramount to helping our clients plan and implement their own broadband networks and create effective partnerships. Our consultants develop real-world, actionable strategies that organizations can rely on to support the development of their broadband initiatives. No other firm in the industry has these combined capabilities.

# Make Gigabit a Reality in Your Community

**Magellan enables communities to plan, implement and manage Gigabit Broadband**



**FEASIBILITY  
STUDIES**



**BROADBAND  
ENGINEERING**



**BUSINESS MODELS  
& PARTNERSHIPS**



**FINANCING  
& GRANTS**



**PROJECT  
MANAGEMENT**

Magellan uses a customized approach in every project based on the needs of our clients and their communities. We develop innovative solutions that allow public and private organizations to best utilize their strengths to expand broadband. Magellan is at the forefront of public-private partnership development, working to negotiate and forge these partnerships between public organizations and private broadband providers. Conquering broadband issues often takes the participation of multiple parties that are aligned around common goals. Magellan helps communities recruit innovative providers and form strategic partnerships that benefit providers and the communities they serve.

## Feasibility Studies

Magellan helps public organizations and broadband operators determine reasonable expectations for deploying fiber to the premise networks. We develop comprehensive feasibility studies that assess the current broadband environment and determine the opportunities to deploy advanced broadband networks. Our feasibility studies are real world tested and based on the latest broadband industry trends that provide strategic direction for communities to achieve their broadband goals.

- Community Needs Assessments
- Market Analysis & Current Environment
- Network Analysis & Inventory
- Business Models & Financial Planning
- Design & Engineering
- Opportunity, Risk & Benefit Analysis

## Broadband Engineering

Our broadband design and engineering services provide the latest technical designs for fiber-to-the-premise, backbone, metro and long-haul networks. Our wireless design and engineering services develop effective fixed wireless, microwave and WiFi networks to cover the most challenging terrain. Our services cover all aspects of broadband design and engineering, from outside plant fiber and wireless, to equipment, to services and content, to BSS/OSS and systems integration.

- FTTH, FTTP, Metro & Long-Haul Fiber
- Fixed Wireless, Microwave & WiFi
- GPON, Active Ethernet & WDM
- Routing, Switching & MPLS
- Internet, Voice & Video Integration
- BSS/OSS & Network Management Systems

## Business Models & Partnerships

Magellan is on the forefront of emerging business models and partnership development within the broadband industry. We successfully plan, negotiate and execute partnership agreements between public organizations and private operators, leveraging the strengths of each organization to benefit the community. We have a stellar record of recruiting broadband providers to local communities and helping these organizations make their communities Gigabit Ready.

- Dark Fiber, Open Access, Triple Play
- Feasibility Analysis of Business Models
- Public-Private Partnership Development
- Partner Recruitment & RFQs
- Advocacy & Negotiation in Partnerships
- Opportunity, Risk & Benefit Analysis

## Financing & Grants

Magellan provides extensive financial planning services for organizations looking to invest in advanced broadband networks. Our extensive financial plans help government organizations and private operators understand the opportunities and risks and the most feasible financial strategies to achieve their goals. Our plans are investment ready and are routinely used to support funding with bond underwriters, banks, private equity firms and grant programs. Magellan also maintains a portfolio of financing partners and grant programs that we bring to communities to help them acquire funding.

- Investment-Ready Financial Plans
- Funding Development
- Partner Recruitment
- Broadband Grant Writing & Management
- FCC, E-Rate, CAF & State Programs
- Economic Development Grant Programs

## Project Management

Magellan helps operators, utilities and government organizations implement next-generation networks. We provide turnkey project management services that enable these organizations to maintain resources that cover every aspect of deploying broadband networks, from fiber and wireless network deployment, to equipment and content integration, to marketing and sales, to operations and management. Magellan provides the only turnkey solution that enables these organizations to deploy their networks in a timely manner and launch their networks with the confidence to achieve the best results in their communities.

- Procurement & Contract Negotiation
- Construction Management
- Network Commissioning & Certification
- Content Acquisition & Agreements
- Sales, Marketing & Business Development
- Business & Operations Management

## Additional Services

Magellan provides a wide range of supplementary services in information technology and security, smart city planning and networking technology fields. Many of our services complement one another, allowing Magellan to provide a one-stop-shop for our clients' full range of broadband, smart city, IT and security needs. Magellan's experts lead the industry in planning and deploying the latest technology solutions to meet a wide range of business needs. As the Internet of Things transitions from concept to reality, Magellan helps its clients adapt to the rapidly changing world and prepare communities to thrive in the digital domain.

- Information Technology
- Smart City Consulting
- Public Safety CJIS Consulting
- Utility Security & SCADA Consulting
- PCI Compliance & Implementation
- Information Security Consulting

## Key Principals



### **John Honker – President & CEO**

John is a seasoned broadband and telecom executive with 20 years experience across public and private sectors. His first 10 years were spent with Columbus Networks planning and managing broadband networks across 20 countries in the Americas region. Under his leadership, Columbus' Internet Services grew from \$0 to \$100 million in annual revenue over 7 years. As a key founder of Magellan, John has managed over 100 public and private broadband projects across the US and abroad. Other engagements included the development of the City of Riverside, CA's fiber business model, the City of Baltimore's citywide fiber strategies and Missoula's next-generation fiber plan. John holds an MBA in Finance and Management from the University of Miami and a BA in Philosophy from Stetson University.



### **Kyle Hollifield – SVP of Sales & Marketing**

Kyle Hollifield is a 25-year veteran of the telecommunications industry and most recently has held the position of Vice President of Business Development and Marketing at Bristol Virginia Utilities Authority (BVU), while managing the FOCUS division providing consulting services to other communities wishing to build or improve high speed broadband networks. Kyle has served on the Board of Directors of The North American Fiber to the Home Council, most recently as Chairman of the Board of Directors. Hollifield also serves as Vice-Chair of Broadband Communities Magazine and has made many presentations on broadband policy and opportunities to the FCC, RUS, NTIA, NATOA, APPA, National League of Cities, Rural Telecom Cooperative, FTTH, Broadband Communities and NCTC.



### **Courtney Violette – SVP of Operations**

Courtney has led dozens of municipal broadband planning and implementation projects across the country. He is a Certified Fiber-To-The-Home Professional and holds a number of technical certifications in broadband, information technology and information security. Prior to joining Magellan, he spent 6 years as the CIO for the City of Palm Coast. During this time, he planned and built the first true City-owned open-access network in the Southeast. Through his leadership, the network grew to serve government, business, education and healthcare needs across the City, saving these organizations millions of dollars and providing gigabit connectivity to meet the community's needs. Courtney holds a MA in Information Technology Management and a BS in Computer Science from Webster University.



### **Jory Wolf – VP of Digital Innovation**

Jory joined Magellan after 22 years as CIO of the City of Santa Monica, CA where he launched Santa Monica City Wi-FiSM, which provides free internet services to the public through a network of 32 hot zones and wireless coverage in most major commercial and transit corridors throughout the city. He created Santa Monica City NetSM, a 100 gigabit broadband initiative to support an environment for local businesses to compete in the global economy with cutting edge network solutions. Jory has over 35 years of experience in Information Technology, including broadband, FTTH and Smart City initiatives. Jory and his teams have received over 50 awards for information technology projects during his career and in 2012 he received the CIO Lifetime Achievement Award from the Los Angeles Business Journal.

### **Scott Moehnke – Senior Broadband Consultant**



Scott is a 30-year veteran of the utility and telecommunications industries specializing in executive and operational management, business development, and information technology. Recently, Scott was Chief Operations Officer at Bristol Virginia Utilities (BVU), a municipal electric company known for being a global pioneer in triple play, and all-fiber broadband. BVU developed one of the first publically owned fiber to the home networks in the United States, which became a model for others to follow in pursuing broadband goals. Prior to joining BVU, Scott established several consulting firms to assist telecom companies in all facets of business operations. He worked with Lafayette Utilities Service as lead project manager for their FTTH deployment. Scott holds a BS in Computer Science from the University of Texas, Austin.

### **Eric Ogle – Senior Broadband Consultant**



Eric has spent most of his career involved in planning and policy with focus on technology-driven economic development for Appalachian communities. Prior to joining Magellan, Eric spent 13 years as Research Associate with University of Tennessee's Baker Center for Public Policy. Among significant projects, Eric led development of the first two community wireless networks in the Southeast. Eric has project management experience serving as Principal Investigator for corporate and federal sponsors, often engaging stakeholders in participatory processes. Eric holds positions in organizations, including a role as Treasurer of the Rural Telecommunication Congress. Prior to UT, Eric held economic development positions with Newport Utilities, the Tennessee Valley Authority, and Cocke County government. Eric holds an MS in Planning and a BS in Business Administration, Marketing and Logistics, all from the University of Tennessee, Knoxville.

## Sample Projects

### Riverside, CA – Fiber Business Model

Magellan was retained by Riverside Public Utilities (RPU) to conduct a Fiber Business Model for the expansion of FTTx services. The RPU Fiber Business Model assessed options for expansion of RPU's current Fiber infrastructure in a range of retail and wholesale business model. Magellan performed a thorough analysis of RPU's extensive fiber optic network, along with a thorough needs assessment for the City of Riverside, which analyzed the current level of services throughout the City by incumbent providers, as well as a gap analysis and opportunity assessment. Magellan's plan analyzed various business and financial models for future expansion of the RPU network as a tool to spur economic development in the City of Riverside. The Plan also developed long-term municipal strategies to leverage RPU's fiber network to implement public works, public safety, utility and smart city projects to improve municipal operations and reduce cost.

### City of Baltimore, MD - Fiber Optic Planning Study

Magellan was hired by the City of Baltimore, MD to conduct a comprehensive study on the ways the City could utilize its 3.7 million feet of underground conduit and fiber to expand the availability, affordability, and adoption of broadband services in the community. The project entailed a significant outreach process with the Smarter Cities Task Force to identify, measure, and plan for the needs of every class of community anchor in Baltimore. Magellan was tasked with providing an analysis of how the City's infrastructure and public policy tools could be made more effective to serve the needs of its community. Magellan helped Baltimore evaluate the various options, benefits, risks and costs for use of this infrastructure, along with comprehensive financial and business plans that indicated a range of outcomes for the City. This information will be used by the City officials to make decisions on what steps are most appropriate for Baltimore to take to secure its broadband future.

### City of Columbia, MO – Broadband Feasibility Study

Magellan was retained by the City of Columbia, MO to conduct a comprehensive broadband planning and feasibility study. Magellan helped Columbia, Boone County and the University of Missouri determine the overall broadband needs for its community and develop a plan to meet those needs through the City's extensive fiber optic network. Magellan completed a thorough needs assessment that defined the current environment, market, services, needs, both current and future, and gaps in existing services. We developed a comprehensive plan for build-out of the City's network to meet these needs, using strategic business insight and sound financial planning strategies. Taking advantage of the City's current network, our plan identified opportunities to utilize the existing infrastructure to significantly reduce the build-out costs. Magellan developed a plan to attract competitive service providers to the area with the intent of creating more options for local businesses, more competition and lower prices. The build-out entailed bringing fiber-based broadband services to community anchors across the local area, followed by a buildout to local businesses and finally a potential residential Fiber to the Home build.

## Partial Client List

- Morristown Utility Systems, TN
- Appalachian Electric Cooperative
- Newport Utilities, TN
- Salt River Project
- City of Rancho Cucamonga, CA
- City of West Hollywood, CA
- Rancho Santa Fe, CA
- Riverside Public Utilities, CA
- City of Riverside, CA
- City of Davis, CA
- City of West Sacramento, CA
- City of Woodland, CA
- Yolo County, CA
- City of Bartow, FL
- City of Winter Garden, FL
- City of Clermont, FL
- Seminole County, FL
- Flagler County School District, FL
- City of Manors, FL
- City of Jupiter, FL
- Matawa First Nations, Ontario, CA
- Niobrara County, WY
- City of Fort Morgan, CO
- Port of Whitman County, WA
- City of Hamilton, OH
- City of Ketchum, ID
- City of Missoula, MT
- Missoula County, MT
- Colorado EAGLE-Net
- Arizona GovNET, Inc.
- Columbia County, GA
- City of Hamilton, OH
- City of Winter Haven, FL
- New Zealand Ministry of Econ Development
- City of Winter Park, FL
- City of Baltimore, MD
- City of Rock Falls, IL
- North Florida Broadband Authority, FL
- City of Sunrise, FL
- Florida Rural Broadband Alliance, FL
- City of Fort Lauderdale, FL
- Strathcona County, Alberta, Canada
- City of Columbia, MO
- Boone County, MO
- City of Waverly, IA
- City of Palm Coast, FL
- City of Cocoa, FL
- City of Palm Beach Gardens, FL
- City of Ormond Beach, FL
- City of Wellington, FL
- City of Hallandale Beach, FL
- City of Port Orange, FL
- City of Mooresville, NC
- City of Davidson, NC
- City of Walla Walla, WA
- Port of Walla Walla, WA
- City of Lakeland, FL
- Converse County, WY
- Northeast Texas Ed Consortium, TX
- City of Birmingham, AL
- Niagara County, NY
- City of Syracuse, NY
- City of Tuscaloosa, AL
- Orlando Utilities Commission, FL
- Indianola Municipal Utilities, IA
- Chicopee Electric Light, MA
- S. Florida Regional Planning Council
- City of Rancho Cucamonga, CA
- Yuma County, CO
- Vermont Electric Power Company
- City of Sun Valley, ID
- City of Hailey, ID
- City of Winters, CA
- Ulster County, NY
- City of White Pine, TN
- City of Dandridge, TN
- Jefferson City, TN
- City of College Station, TX
- City of Bryan, TX
- City of Bristol, VA
- City of Cornelius, NC
- City of Davenport, IA
- City of El Segundo, CA
- City of Centennial, CO
- City of West Hollywood, CA
- City of Highlands, NC
- Massachusetts Broadband Institute
- State of Vermont
- City of Lake Jackson, TX
- City of Daytona Beach, FL
- City of Hudson, OH
- City of Mont Belvieu, TX
- City of Fort Collins, CO
- University of Florida, PURC
- State of Florida
- Fort Pierce Utilities Authority, FL

# Statement of Work

## I. Background

Indianola Municipal Utilities (“IMU”) Feasibility Study indicated that the development of a broadband utility is a realistic opportunity. Analysis of the broadband environment in Indianola found that IMU has a strong opportunity to become a retail residential and business services Internet broadband provider to the community of Indianola. The findings and recommendations of the Broadband Feasibility Study were presented to the IMU Board who recommended that Indianola Municipal Utilities continue with the next steps to develop and implement the broadband utility.

The next steps in the process encompass three main tasks: (1) development of the FTTx Network Engineering Design; (2) creation of the formal Business Plan for the broadband utility; and (3) creation of the overall Implementation Plan.

### Task 1: Formal Network Design

Magellan will create a formal PE approved network design and final as-built diagrams. Following is a list of the high-level areas addressed in the task.

- **Planning**
  - Node locations (splitter cabinet)
  - Splitter types, fiber types
  - Fiber cut sheets
  - Path creations (a single fiber per residence)
- **Path Creation**
  - Best possible construction method
  - Field and data base collection
    - Road widths
    - Right-of-way widths
    - Hard points or standing structures within row
    - Construction methods (bore, plow, trench)
    - Handhold and pedestal location
    - Wiring limits for fiber pedestals or MST tails
    - Insure each residence is passed with a single fiber
- **Permit application and acquisition for DOT, county, and all townships**
  - Right-of-Way research for back lot easements or alley ways (excludes DNR or Wetland permitting)
- **Construction RFP**
  - Final construction totals and materials
  - Fiber splicing and testing specifications
  - Cabinet specifications
  - Final construction methods
- **PE Stamp for route design and construction practices**
- **Final As-Builts**

- Project Management and Oversight, Quality Control, and Quality Assurance of Task

## **Task 2: Broadband Business Plan**

The Broadband Business Plan will create a formal statement of the broadband utility's business goals, explanation of why these goals are attainable and strategies to achieving these goals. It will build on findings of the Broadband Feasibility Study to develop a market-ready business plan and financing strategies that contain the following features:

- **Executive Summary**  
High-level overview of IMU's broadband strategy and the means to achieve it, focused on key organizational, operational and financial requirements for the utility.
- **Broadband Utility Overview**  
Overall mission of IMU's broadband utility and the reasons behind it, focusing on need and long-term benefits of the utility to the community. It also provides information on the structure of IMU, how it will be organized and the regulatory structure of the utility.
- **Products and Services**  
Products and services that IMU will offer and why. It will provide justification for IMU's portfolio citing key analyses from the Broadband Feasibility Study Market Analysis regarding the types of services offered, rate structures and other relevant information in IMU's offerings.
- **Market Analysis**  
Overview of the Indianola broadband and telecommunications market and why IMU has an opportunity to pursue a broadband utility. The market analysis will describe IMU's competitive advantages that uniquely position the utility to become a dominant participant in the Indianola broadband market. It will also include critical market strategies IMU will undertake to gain market share and compete successfully across its products and services.
- **Business Strategy**  
Documentation of IMU's value proposition in the Indianola market and what factors will differentiate IMU from the competition, focused on superior products and services, excellent customer experience and community affiliation. It will provide a go-to-market strategy for IMU that focuses on capturing significant market share early in the project. Key to this strategy will be defining when IMU turns up service in its customer markets and what strategies it uses to prioritize the construction and roll-out of its network.
- **Operations Plan**  
Description of how IMU will operate the broadband utility including customer provisioning, billing, service, support, network operations, outage management and general operations. Operational process will be documented to identify resource requirements. It will also detail the staffing plan for IMU, identify key contractors and the timing to retain these resources. And, it will define the BSS/OSS systems necessary for IMU to operate its utility and integration requirements with other utility and third-party software.

- **Financial Plan**

Magellan will expand on the initial financial plan developed in the Broadband Feasibility Study to provide an investment-ready funding plan for IMU that includes the required pro-forma financial statements and key financial ratios financiers generally require in broadband utility projects. The financial plan will also include analysis of key cost and revenue drivers and perform sensitivity analysis on the broadband utility to determine a range of potential financial outcomes. Magellan will work with IMU to target potential funding sources and support IMU in the process of securing funding for the project.

- **Implementation Plan**

Description of how IMU will implement the broadband utility and deliver services to market. It will include tasks for the technical implementation of IMU's network, use of new fiber-optic facilities, data center facilities, equipment, services, installation and customer activation. It will call on the FTTH Engineering Design to describe how IMU's fiber-optic network will integrate with other outside plant facilities, IMU's headend and service deployment.

- **Risk Analysis**

This risk analysis provides an overview of the potential financial and non-financial risks in meeting objectives in the broadband utility. The risk analysis examines the potential issues that may negatively impact the utility, some that are within the utility's power to control, others that are not. The objectives of the risk analysis are to determine the variables that are highly sensitive to the business and the negative impact that changes to these variables may have on the ability to cover costs and/or pay debt service. This analysis covers key variables including market penetration rates and network construction costs.

### **Task 3: Implementation Plan**

Magellan will create a formal in-depth implementation plan detailing the tasks, subtasks, and associated timelines necessary to implement the business plan's goals and objectives. The plan is the roadmap for a successful completion of the subsequent actual physical implementation of the project. Below is an example of just some of the high-level areas addressed in the plan. Each area will have numerous subtasks further defining the steps necessary for completion of the task.

- Legal requirements for Iowa broadband utilities
- Creation of a stand-alone broadband utility, if desired
- Develop necessary operational contracts (e.g. Master Service Agreements, SLA's, etc.)
- Data center (headend) and office space design and renovations
- Network equipment selection, configuration, and testing
- Software selection, setup and implementation (OSS/BSS, Provisioning, Network Monitoring, etc.)
- Accounting setup, processes, and readiness (chart of accounts, collections, etc.)
- Resource hiring and training per staffing plan
- Wholesale Internet provider selection and implementation
- Network buildout contractor(s) selection, buildout oversight, testing
- Product and services definitions
- Marketing and sales
- Customer and trouble support process setup

- Billing configuration and test
- Operational processes and procedures (e.g. data redundancy; internal network, etc.)
- System and network maintenance schedules and monitoring
- Web portal presence
- Reporting
- Disaster recovery process
- Select pilot clients for beta test cycle
- Network and beta testing
- Final rollout
- Timeline for each area based on network buildout schedule

## Deliverables

Deliverables for this project include:

- **Task 1: Formal Network Design**
  - Formal PE approved network design
  - Construction RFP
  - Final As-Builts
  - Timeline: Estimated three to four business-months from approved start date for PE approved network design and RFP. As-builts will be delivered throughout construction phase.
- **Task 2: Business Plan**
  - Broadband Business Plan narrative including all areas listed in “Task 2: Business Plan” section above.
  - Finalized Broadband Financial Plan, including Magellan’s Broadband Financial Sustainability Plan, investment-ready pro-forma financial statements and financial performance analysis with accompanying financial summary
  - Timeline: Estimated three business-months from approved start date
- **Task 3: Implementation Plan**
  - Implementation Plan
  - Timeline: Implementation Plan will be created, where possible, in parallel with the Business Plan. It is estimated that plan will be completed within one business-month post Business Plan completion.

# Project Timeline

Month >	1	2	3	4
<b>Task 1: Formal Network Design</b>				
<b>Task 2: Business Plan</b>				
<b>Task 3: Implementation Plan</b>				

\* As-builts will be completed outside above timeline during construction phase

## Project Pricing

Pricing for the project includes all work completed by Magellan or its agents for Indianola Municipal Utilities as stated under this Proposal, exclusive of travel and incidental expenses, which will be billed as incurred.

Project Task	Unit Cost	Unit Type	Number of Units	Estimated Line Total
<b>Task 1: Formal Network Design</b>				
Underground Design	\$0.97	Ft.	244,000	\$236,680
As-Builts	\$0.12	Ft.	244,000	\$29,280
Project Management and Oversight, QA/QC, PE Stamp Delivery	\$140	Hr.	250	\$35,000
				<b>\$300,960</b>
<b>Task 2: Business Plan</b>	\$140	Hr.	250	<b>\$35,000</b>
<b>Task 3: Implementation Plan</b>	\$140	Hr.	320	<b>\$44,800</b>
<b>Estimated Total</b>				<b>\$380,760</b>

If additional services are required beyond the stated hours, Magellan is happy to bill on an hourly basis or provide an additional quote for additional services. Magellan will submit invoices to the IMU monthly for actual hours billed and actual expenses incurred on the project. Magellan is happy to provide net 30 terms to the IMU on all invoices.

## Signature & Acceptance

Signature of this Proposal by Client warrants that all components of this Proposal are acceptable to the IMU and that the person(s) signing this Proposal has the right, power and authority to execute the Proposal.

Magellan Advisors, LLC  
A Florida Limited Liability Company  
999 18<sup>th</sup> Street, Suite 3000  
Denver, CO 80202

Client

Print Name: John Honker

Print Name:

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Title: President & CEO

Title:

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Signature:



Signature:

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Date: July 5, 2016

Date:

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**Meeting Date:** 07/18/2016

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**Information**

**Subject**

Consider DA Davidson Placement Agent Engagement Letter

**Information**

Attached to this agenda item is a placement engagement letter received from Michael Maloney, Senior Vice President of Public Finance at DA Davidson.

**Financial Impact**

N/A

**Staff Recommendation**

Simple motion is in order.

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**Attachments**

[DA Davidson Placement Agent Engagement Letter](#)

June 30, 2016

Mr. Rob Stangel  
General Manager  
Indianola Municipal Utilities  
110 N 1st St  
Indianola IA 50125

Re: Placement Agent Engagement Letter

Mr. Stangel:

On behalf of D.A. Davidson & Co. (“we” or “Davidson”), we wish to thank you for the opportunity to serve as placement agent for Indianola Municipal Utilities (“you” or the “Issuer”) on its proposed offering and issuance of approximately \$11,500,000 Communication Utility Revenue Capital Loan Notes, Series 2016 and \$4,500,000 Subordinate (Working Capital) Communications Utility Revenue Capital Loan Notes (the “Securities” or “Loan(s)” or “Notes”). In compliance with Municipal Securities Rulemaking Board (“MSRB”) Rule G-23, this letter will confirm the terms of our engagement.

1. Services to be Provided by Davidson. The Issuer hereby engages Davidson to serve as placement agent of the proposed offering and issuance of the Loan(s), and in such capacity Davidson agrees to provide the following services:

- Review and evaluate the proposed terms of the offering and the Loan(s)
- Develop a marketing plan for the offering, including identification of potential investors
- Assist in the preparation of the offering documents
- Contact potential investors, provide them with offering-related information, respond to their inquiries and, if requested, coordinate their due diligence sessions
- Consult with bond counsel and other service providers about the offering and the terms of the Loan(s)
- Inform the Issuer of the marketing and offering process
- Negotiate the pricing, including the interest rate, and other terms of the Loan(s)
- Plan and arrange for the closing and settlement of the issuance and the delivery of the Loan(s)
- Such other usual and customary placement services as may be requested by the Issuer

In addition, at the Issuer's request, Davidson may provide incidental advisory services, including advice as to the structure, timing, terms and other matters concerning the issuance of the Loan(s).

Davidson is required to make the following disclosure pursuant to Municipal Securities Rulemaking Board ("MSRB") Rule G-23: Davidson will be providing such advisory services in its capacity as underwriter and not as a municipal advisor to the Issuer. As placement agent, Davidson's primary role is to arrange for the placement of the Securities in an arm's length commercial transaction between the Issuer and Davidson. Davidson has financial and other interests that differ from those of the Issuer.

As placement agent, Davidson will not be required to purchase the Loan(s) or to find one or more buyers of the Loan(s), but rather to use its reasonable best efforts to sell the Loan(s) to one or more buyers.

In addition, the Issuer acknowledges receipt of certain regulatory disclosures as required by the MSRB that are attached to this agreement as Exhibit A. Issuer further acknowledges that Davidson may be required to supplement or make additional disclosures as may be necessary as the specific terms of the transaction progress.

2. Fees and Expenses. Davidson's proposed placement agent fee/spread is not to exceed 2.00% of the principal amount of the Securities issued. The Issuer shall be responsible for paying or reimbursing Davidson for all other costs of issuance, including without limitation, bond counsel, placement agent's counsel (if any) and ratings agency fees and expenses (if any), and all other expenses incident to the performance of the Issuer's obligations under the proposed offering.

3. Term and Termination. The term of this engagement shall extend from the date of this letter to the closing of the offering of the Securities.

4. Miscellaneous. This letter shall be governed and construed in accordance with the laws of the State of Iowa. This Agreement may not be amended or modified except by means of a written instrument executed by both parties hereto. This Agreement may not be assigned by either party without the prior written consent of the other party.

If there is any aspect of this Agreement that you believe requires further clarification, please do not hesitate to contact us. If the foregoing is consistent with your understanding of our engagement, please sign and return the enclosed copy of this letter.

Again, we thank you for the opportunity to assist you with your proposed financing and the confidence you have placed in us.

Very truly yours,

D.A.DAVIDSON & CO.

By:

A handwritten signature in cursive script that reads "Michael P. Maloney Jr.".

Title: Senior Vice President – Public Finance

Accepted this \_\_\_ day of \_\_\_\_\_, 2016

INDIANOLA MUNICIPAL UTILITIES

By: \_\_\_\_\_

Title: \_\_\_\_\_

## EXHIBIT A

D.A. Davidson & Co. (hereinafter referred to as “Davidson” or “placement agent”) intends/proposes to serve as a placement agent, and not as a financial advisor or municipal advisor, in connection with the issuance of the Loan(s).

As part of our services as placement agent, Davidson may provide advice concerning the structure, timing, terms, and other similar matters concerning the issuance of the Loan(s).

### Disclosures Concerning the Placement Agent’s Role:

- (i) MSRB Rule G-17 requires a placement agent to deal fairly at all times with both municipal issuers and investors.
- (ii) The placement agent has a duty to place the Loan(s) from the Issuer at a fair and reasonable price, but must balance that duty with their duty to sell the Loan(s) to investors at prices that are fair and reasonable.

### Disclosures Concerning the Placement Agent’s Compensation:

As placement agent, Davidson will be compensated by a fee that has been set forth in the engagement letter. Payment or receipt of the placement fee will be contingent on the closing of the transaction and the amount of the fee may be based, in whole or in part, on a percentage of the principal amount of the Loan(s). While this form of compensation is customary in the municipal securities market, it presents a conflict of interest since the placement agent may have an incentive to recommend to the Issuer a transaction that is unnecessary or to recommend that the size of the transaction be larger than is necessary.

### Additional Conflicts Disclosure:

Davidson has not identified any additional potential or actual material conflicts that require disclosure.

### Disclosures Concerning Complex Municipal Securities Financing:

Since Davidson has recommended to the Issuer a financing structure that may be a “complex municipal securities financing” for purposes of MSRB G-17, the following is a description of the material financial characteristics of that financing structure as well as the material financial risks of the financing that are known to us and reasonably foreseeable at this time.

#### Risk Disclosures Pursuant to MSRB Rule G-17 - Fixed Rate Bonds

The following is a general description of the financial characteristics and security structures of fixed rate municipal bonds (“Fixed Rate Bonds”), as well as a general description of certain financial risks that you should consider before deciding whether to issue Fixed Rate Bonds.

### **Financial Characteristics**

*Maturity and Interest.* Fixed Rate Bonds are interest-bearing debt securities issued by state and local governments, political subdivisions and agencies and authorities. Maturity dates for Fixed Rate Bonds

are fixed at the time of issuance and may include serial maturities (specified principal amounts are payable on the same date in each year until final maturity) or one or more term maturities (specified principal amounts are payable on each term maturity date) or a combination of serial and term maturities. The final maturity date typically will range between 10 and 30 years from the date of issuance. Interest on the Fixed Rate Bonds typically is paid semiannually at a stated fixed rate or rates for each maturity date.

**Redemption.** Fixed Rate Bonds may be subject to optional redemption, which allows you, at your option, to redeem some or all of the bonds on a date prior to scheduled maturity, such as in connection with the issuance of refunding bonds to take advantage of lower interest rates.

Fixed Rate Bonds will be subject to optional redemption only after the passage of a specified period of time, often approximately ten years from the date of issuance, and upon payment of the redemption price set forth in the bonds, which may include a redemption premium. You will be required to send out a notice of optional redemption to the holders of the bonds, usually not less than 30 days prior to the redemption date. Fixed Rate Bonds with term maturity dates also may be subject to mandatory sinking fund redemption, which requires you to redeem specified principal amounts of the bonds annually in advance of the term maturity date. The mandatory sinking fund redemption price is 100% of the principal amount of the bonds to be redeemed.

### **Security**

Payment of principal of and interest on a municipal security, including Fixed Rate Bonds, may be backed by various types of pledges and forms of security, some of which are described below.

**Revenue Bonds.** “Revenue bonds” are debt securities that are payable only from a specific source or sources of revenues. Revenue bonds are not a pledge of your full faith and credit and you are obligated to pay principal and interest on your revenue bonds only from the revenue source(s) specifically pledged to the bonds. Revenue bonds do not permit the bondholders to compel you to impose a tax levy for payment of debt service. Pledged revenues may be derived from operation of the financed project or system, grants or excise or other specified taxes. Generally, subject to state law or local charter requirements, you are not required to obtain voter approval prior to issuance of revenue bonds. If the specified source(s) of revenue become inadequate, a default in payment of principal or interest may occur. Various types of pledges of revenue may be used to secure interest and principal payments on revenue bonds. The nature of these pledges may differ widely based on state law, the type of issuer, the type of revenue stream and other factors.

The description above regarding “Security” is only a brief summary of certain possible security provisions for the bonds and is not intended as legal advice. You should consult with your bond counsel and Financial Advisor for further information regarding the security for the bonds.

### **Financial Risk Considerations**

Certain risks may arise in connection with your issuance of Fixed Rate Bonds, including some or all of the following:

*Issuer Default Risk.* You may be in default if the funds pledged to secure your bonds are not sufficient to pay debt service on the bonds when due. The consequences of a default may be serious for you and, depending on applicable state law and the terms of the authorizing documents, the holders of the bonds, the trustee and any credit support provider may be able to exercise a range of available remedies against you. For example, if the bonds are secured by a general obligation pledge, you may be ordered by a court to raise taxes. Other budgetary adjustments also may be necessary to enable you to provide sufficient funds to pay debt service on the bonds. If the bonds are revenue bonds, you may be required to take steps to increase the available revenues that are pledged as security for the bonds. A default may negatively impact your credit ratings and may effectively limit your ability to publicly offer bonds or other securities at market interest rate levels. Further, if you are unable to provide sufficient funds to remedy the default, subject to applicable state law and the terms of the authorizing documents, you may find it necessary to consider available alternatives under state law, including (for some issuers) state-mandated receivership or bankruptcy. A default also may occur if you are unable to comply with covenants or other provisions agreed to in connection with the issuance of the bonds.

This description is only a brief summary of issues relating to defaults and is not intended as legal advice. You should consult with your bond counsel for further information regarding defaults and remedies.

*Redemption Risk.* Your ability to redeem the bonds prior to maturity may be limited, depending on the terms of any optional redemption provisions. In the event that interest rates decline, you may be unable to take advantage of the lower interest rates to reduce debt service.

*Refinancing Risk.* If your financing plan contemplates refinancing some or all of the bonds at maturity (for example, if you have term maturities or if you choose a shorter final maturity than might otherwise be permitted under the applicable federal tax rules), market conditions or changes in law may limit or prevent you from refinancing those bonds when required. Further, limitations in the federal tax rules on advance refunding of bonds (an advance refunding of bonds occurs when tax-exempt bonds are refunded more than 90 days prior to the date on which those bonds may be retired) may restrict your ability to refund the bonds to take advantage of lower interest rates.

*Reinvestment Risk.* You may have proceeds of the bonds to invest prior to the time that you are able to spend those proceeds for the authorized purpose. Depending on market conditions, you may not be able to invest those proceeds at or near the rate of interest that you are paying on the bonds, which is referred to as “negative arbitrage”.

*Tax Compliance Risk.* The issuance of tax-exempt bonds is subject to a number of requirements under the United States Internal Revenue Code, as enforced by the Internal Revenue Service (IRS). You must take certain steps and make certain representations prior to the issuance of tax-exempt bonds. You also must covenant to take certain additional actions after issuance of the tax-exempt bonds. A breach of your representations or your failure to comply with certain tax-related covenants may cause the interest on the bonds to become taxable retroactively to the date of issuance of the bonds, which may result in an increase in the interest rate that you pay on the bonds or the mandatory redemption of the bonds. The IRS also may audit you or your bonds, in some cases on a random basis and in other cases targeted to specific types of bond issues or tax concerns. If the bonds are declared taxable, or if you are subject to

audit, the market price of your bonds may be adversely affected. Further, your ability to issue other tax-exempt bonds also may be limited.

This description of tax compliance risks is not intended as legal advice and you should consult with your bond counsel regarding tax implications of issuing the bonds.

If you or any other Issuer officials have any questions or concerns about these disclosures, please make those questions or concerns known immediately to the undersigned. In addition, you should consult with the Issuer's own financial and/or municipal, legal, accounting, tax and other advisors, as applicable, to the extent you deem appropriate.