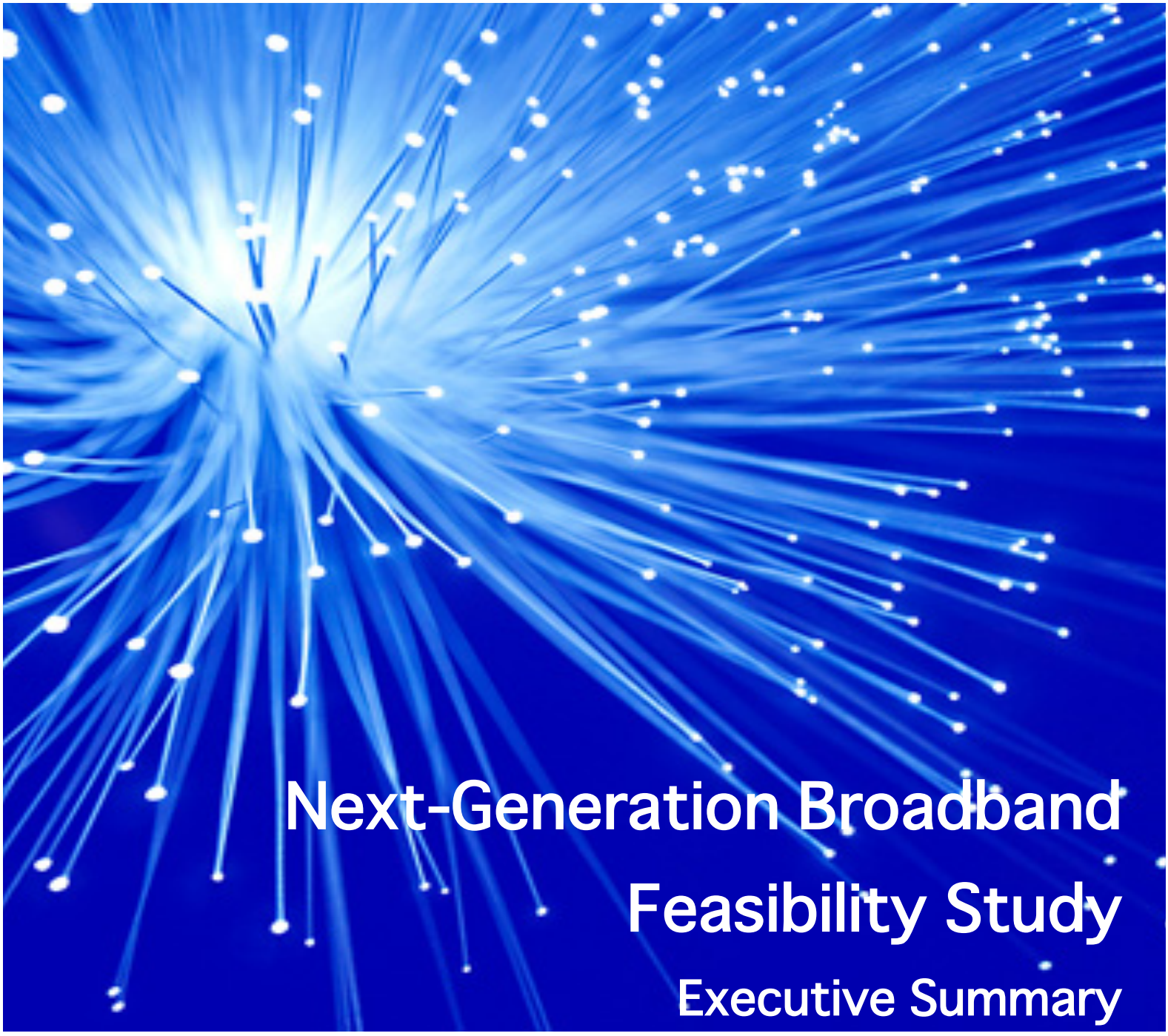

Next-Generation Broadband Feasibility Study

Executive Summary

Stark County Area Broadband Task Team

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DRAFT

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EXECUTIVE SUMMARY

INTRODUCTION

Progressive communities are relying upon municipal and public-private fiber-optic networks to thrive in the new digital world. As constituents continue to adopt new digital platforms, more emphasis is being placed on meeting the growing demands for bandwidth, protective redundancy and competitive pricing. Communities that have invested in fiber infrastructure are reaping the economic benefits of these assets and are leveraging them to bring next-generation broadband to their residents, businesses, and governmental/community support organizations.

The Stark County Area Broadband Task Team (SCABBTT), a volunteer grassroots organization, has been working to encourage a regional approach to the promise of next generation connectivity and skills. Collaborating on an investment in the broadband infrastructure that will ensure inclusive opportunities for all to thrive in our digital economy, they believe, is the moral responsibility of a community. The Task Team's vision is aspirational; members are passionate about the need for affordable Internet at globally competitive speeds. They share a long-term goal of a "gig" to every home and support a policy of free service to schools, libraries, and government/community support agencies.

Stark County and its governmental/community support organizations currently contract for leased lines by incumbent providers. These contracts account for millions of dollars that are paid to incumbent providers each year, which could otherwise be invested locally through key partnerships under the right business case. Many community anchor facilities currently contract for high-speed broadband delivered by fiber, however they report the need for more bandwidth, and in some cases the costs can be prohibitive. Though there are portions of the County that are well served, this is the exception – not the rule.

Current Stark County governmental entities own little in the way of wireline telecommunications assets. There is some fiber and conduit owned by municipalities and a few community anchors. The Stark County Area Broadband Task Team wants to change that. SCABBTT leaders believe Internet access is the "fourth utility" critical to a community's ability to "go forth" (see forthutility.org), and that all citizens, businesses and anchors need scalable, affordable access. SCABBTT realizes that this infrastructure is a key asset and has deemed additional investment necessary. Through the help of the Herbert W. Hoover Foundation and local partners, SCABBTT was able to secure funding to hire Magellan Advisors, LLC to develop this Broadband Study. SCABBTT has been working together for several years to devise options to increase the amount of local investment in broadband infrastructure. The team has repeatedly invited all current area Internet service providers to partner with them, and is committed to an ongoing public transparency and openness to any and all potential partners. The team realizes that this Study is necessary to propose a roadmap and strategy which will allow the community to more fully engage in the conversation and work together to invest in itself once again.

This Study outlines a high-level network strategy, design, and business model framework to support the needs of Stark County's community anchors, businesses, and residents. It will continually evolve as more entities choose to share information and data that will likely have a positive effect on general cost estimates. This refined work will guide the Stark community through the steps to begin investing in broadband assets that will support the evolution of Stark County and will continue to support the community for decades to come.

OVERVIEW OF COMMUNITY BROADBAND

Fiber is the gold standard for community/government communications, broadband services, and Internet access. Fiber is used to transmit large amounts of data securely over long distances with high reliability. It is flexible enough to support a wide range of applications and scalable enough to support nearly unlimited capacity and speed. It is considered a capital infrastructure asset similar to water, road, and electricity and has a lifespan of up to 50 years or more with the proper installation and maintenance.

Over 1,000 cities and communities in the US own some form of municipal fiber network and have used it for decades to support their operations. These networks are becoming increasingly important to cope with the rapid growth in connected devices. These devices run the gamut from utility assets and street lights, to traffic signals and surveillance cameras. Cities that maintain these networks are able to accommodate these "smart city" technologies which allow them to be more efficient, reduce costs, and increase the value they deliver to their constituents.

Within the past 15 years, some cities have expanded the use of these networks to enhance local broadband services in their communities. As broadband has become a key asset to support economic development, education, healthcare, and other community functions, communities have leveraged their networks to foster fiber-based broadband services, either directly, or more often through partnerships with their local broadband providers.

The U.S. Chamber of Commerce made the support of public-private broadband partnerships a "2016 Public Policy Priority." Organizations such as Smart Cities, The Intelligent Community Forum, and Next Century Cities have organized to share the successes of public-private initiatives and to promote public engagement and oversight, and here in Ohio the Dublin Institute has adopted a mission of "Intelligent Ohio."

OPPORTUNITY STATEMENT

Stark County and its communities have the opportunity to begin making strategic investments in broadband infrastructure which will pay dividends for decades to come. This infrastructure will support and enhance new middle-mile infrastructure[1] connecting community anchors and providing new capacity and assets to the individual communities throughout Stark County. In addition, these investments will form a community owned backbone capable of meeting the communications and technology needs of government and the greater Stark County community.

New broadband investments will become a key resource that Stark County, in partnership with the private sector, will leverage to drive value across a range of governmental and community functions from healthcare, to economic development, as well as bridging the digital divide and providing an overall better quality of life.

Community based investment in telecommunications assets will allow the County and its communities to make decisions on how their community is best served, including decisions around network speeds, content partners, and last-mile infrastructure buildout options. The proposed Stark Community Broadband Network (SCBN) would be funded through user fees paid by participating organizations, and excess network capacity (conduit, fiber, and other vertical assets) which can all be leveraged to generate additional revenue streams.

This network is foundational for the Stark community and will place local leaders into the driver's seat when it comes to driving future investments in telecommunications assets and determining optimal services and service levels. Today, with the exception of Massillon, all investment decisions are made by incumbent providers at the State or National level – hence the reason for a major disparity in services offered and pricing for these services

[1] Middle Mile Infrastructure - The list of interconnection points between the service provider and the Internet backbone. These connections are capable of very high bandwidth, speeds, and capacities and may be service assured.

between the Stark region and other more metropolitan areas.

BENEFITS OF A COMMUNITY BROADBAND NETWORK

There are many benefits Stark County could experience through the development of the Stark Community Broadband Network. These include direct benefits to government, businesses, and residents along with additional "off-balance sheet" benefits such as economic development, better education, healthcare, and the myriad of operational efficiencies that can be realized regionally. While traditional providers cannot include these off-balance sheet benefits in their ROI, communities can – as the health, education, and welfare of its citizens is its primary mission.

Leading Edge Broadband (Business and Residential)

A community broadband network can become a catalyst to accelerate deployment of leading edge broadband services in Stark County. Development of this network presents an opportunity for the Stark community and private Internet service providers to work together to bring the latest fiber-to-the-premise (FTTP) technologies to residents and businesses. By lowering cost barriers to deploy fiber-to-the-premise networks, Stark and its communities can take an active role by developing public-private partnerships with competitive broadband providers. If successful, these partnerships will yield positive economic and social benefits to the Stark community.

Economic Development

Economic development will become a key beneficiary of the Stark Community Broadband Network. This asset can be used as a tool to reduce the cost of doing business in the region while delivering next-generation high-speed Internet services. The SCBN will have the capability to interconnect to regional data centers such as Secure Data 365 and potential centers in Akron, which can provide a gateway to numerous broadband, cloud, and application providers, increasing the number of choices local businesses have for their communications and technology needs. The County and its communities will be able to actively market areas of Stark County as "fiber ready" and provide prospective businesses with a range of available service providers. Stark County will also be able to develop strategic partnerships with current and future broadband providers to market the benefits of Stark County's network and services to businesses.

Education

The SCBN will provide a platform of advanced connectivity to support education in its evolution. Educational institutions around the country have become one of the greatest beneficiaries of community owned fiber networks, and Stark County has an opportunity to take a leadership role locally. Education has become a community responsibility with organizations such as libraries, businesses, and non-profits providing support, internships, and alternatives. Connecting to these new programs and tools requires high-speed, reliable, and affordable connectivity. Though many of Stark County's schools are currently serviced, they question their future ability to upgrade bandwidth easily and cost effectively. As virtual reality, augmented reality, instant language support and access to free, world-class educational resources escalate, so does a community's responsibility to provide for all of its learners – during and beyond the school day.

Public Safety

Public Safety agencies in Stark County will benefit from additional connectivity throughout the region. The network will interconnect the Police and Fire stations to other key locations throughout the County. In addition, it can be used to provide key fiber interconnect points throughout the area to assist in the planning for community events. This network will support future technologies such as License Plate Recognition (LPR) cameras, surveillance cameras, and other types of sensor technology that can provide positive benefits to law enforcement. Regardless of what community broadband model chosen, these fiber-optic lines are, indeed, critical infrastructure. Their

significance grows commensurate with technological advance mentioned throughout all sectors of our lives. Given emergency response our communities have come to expect from our first responders, healthcare providers, transportation and utility crews in times of cold weather extremes and worse, natural disasters such as hurricanes Sandy and Katrina, and to a lesser extent tornados and even earthquakes, these fiber networks significance and demands for service will only increase. It's obvious we can ill afford a repeat of Stark County's past experience with any backhaul network 911 outage issues. A community broadband network routed through a local carrier hotel, such as Secure Data 365, would greatly enhance our viability, redundancy and ability to handle the demands of data, voice or video as well as future NG911 demands tomorrow and far into the future.

Healthcare

Healthcare organizations are rapidly expanding their use of data, as they move from episodic treatment to population health models that leverage their investment in electronic medical records. For these models to work optimally, the organizations and the patients they serve require access to high capacity, reliable broadband services. The patient population that will go online, reporting their data frequently, will expand from those with chronic conditions to those that are simply normal. The SCBN will include capabilities and capacity to support Stark's healthcare organizations, enabling them with fiber connectivity to interconnect hospitals, doctors' offices, clinics, and imaging centers, supporting their implementation of digital healthcare programs for Stark County's residents.

Workforce Development

SCBN can create work opportunities, grow workforce capabilities, and increase citizens' incomes. Broadband gives workers more options for developing and deploying their talents. It is increasingly practical to get specialized knowledge to carry out most any tasks and use many tools on-demand, which makes workers more productive. Many professionals can live where they like and work wherever they're needed, which gives workers access to higher paying "gigs." Broadband opens up new, high-skill job opportunities as companies adopt and buy digital technologies. Even as SCBN makes new ways of working practical, the workforce adds to the value of SCBN for business and economic development. The businesses need skilled workers, workers need skill development, and it all depends on ultra-fast broadband. Digital tools, online learning, and telework are the future of workforce that this is happening now and SCBN can provide access to that future for Stark County's citizens.

BROADBAND FEASIBILITY STUDY

Today, the bulk of Stark County's telecommunications services are provided by traditional incumbent and regional competitive providers. The overwhelming majority of services are provided over legacy copper networks, with fiber-optic and point-to-point wireless services available in certain areas of the County. Community investment in the SCBN will allow regional organizations and businesses access to next-generation Internet services at competitive prices. Local investment will potentially reduce the ongoing operating costs of many governmental and community support organizations, futureproofing their telecommunications needs. This Broadband Feasibility Study outlines a roadmap to investment in middle-mile (backbone) fiber assets, which will connect community anchors and provide new technology platforms and broadband assets for communities to further local investment and decision making in last-mile networks.

While SCABBTT's vision includes Gigabit for all, consensus have been developed amongst the Task Team to develop an actionable roadmap that will allow the community to begin making incremental, strategic investments in broadband. This Study cannot outline or recommend a "build and they will come" last-mile solution due to the size and geographic makeup of Stark County. Pulling relevant industry data from a recently released FTTH study for the City of Madison, WI – we can extrapolate cost structures that could apply to Stark County. In Madison's case, building a ubiquitous Fiber-to-the-Premise network would cost the City at least $143.5 million and could cost as much as $212 million depending on the business model selected. For Madison, best case estimates using a

combination of aerial and underground construction and including all network electronic, drops, and customer premise equipment (CPE) are approximately $194 million dollars to serve 35% of residents and businesses served by the fiber.

Stark County includes 165,000 residential units. If we utilize an average industry cost per passing (avg. cost per home served) of $1,500 per unit, we can identify a full fiber buildout cost in the range of $250 million. When we apply a cost of $1,250 per subscriber connected (to cover drop fiber cable, CPE[2], and battery backup) and apply a 35% uptake, we arrive at a budget just for subscribers connected of $72.5 million. In addition to these costs, design/engineering, data center, network components, and operational requirements will likely push a FTTP project for Stark into the $330 - $400 million range – again, to connect 35% of premises in the County.

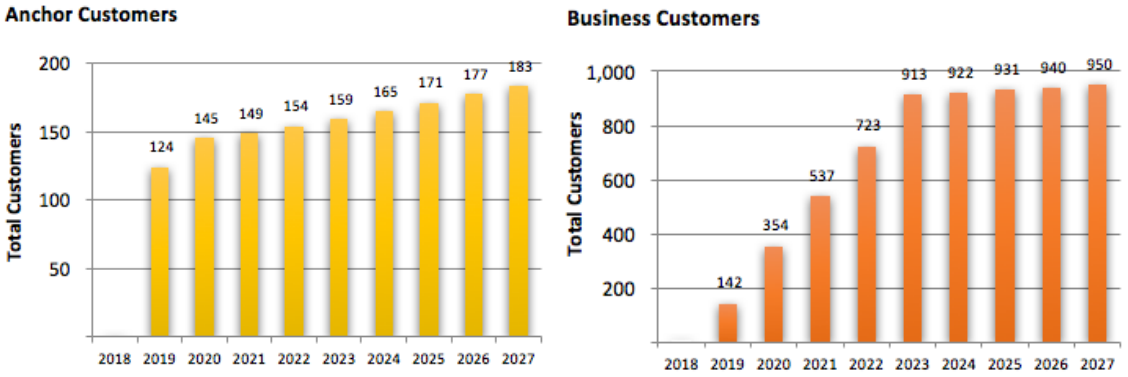
A $330 - $400 million investment to buildout a FTTP network throughout Stark County is unlikely at this point due to economic conditions and political will, however, a measured, strategic approach to making incremental investments in the County are likely to be supported if an actionable roadmap is clearly delivered.

FINANCIAL SUMMARY

Stark County and its communities have the opportunity to invest in a locally owned and controlled fiber backbone network capable of connecting community anchors, businesses, and residential communities throughout the region. As outlined in this Study, the County could invest upwards of $22 million to fund a fiber buildout of nearly 100 miles of backbone fiber and over 35 miles of lateral connections to connect 140 community anchor facilities and three regional data centers. This fiber network could provide capacity and infrastructure to drive last-mile investments to serve the greater Stark County market. In addition, these new fiber routes will pass over 10,000 Stark County based businesses who can take advantage of this new infrastructure.

Over a projected 20-year period, this model assumes the connection of 140+ anchors over the first three years and additional wholesale business customers as outlined below in Figure 1.

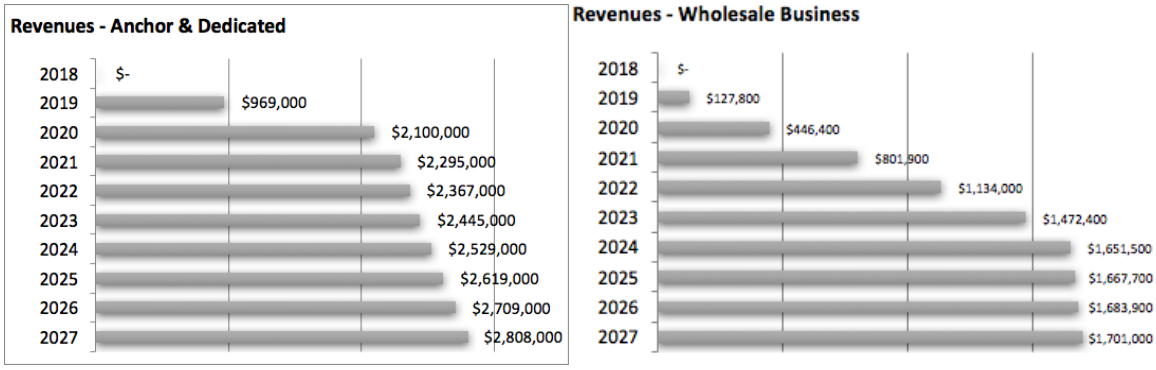
FIGURE 1: PROJECTED ANCHOR AND BUSINESS CUSTOMER PROJECTIONS



With these projections, revenues from anchor and wholesale business customers will grow from an estimated $2.5 million in Year 3 to nearly $5 million by Year 10. These revenue models show community anchor revenue accounting for 66% percent of all system revenue. With additional growth in wholesale business services, plus the modest 10% uptake included in this model, revenues will grow much faster with additional subscribers taking service.

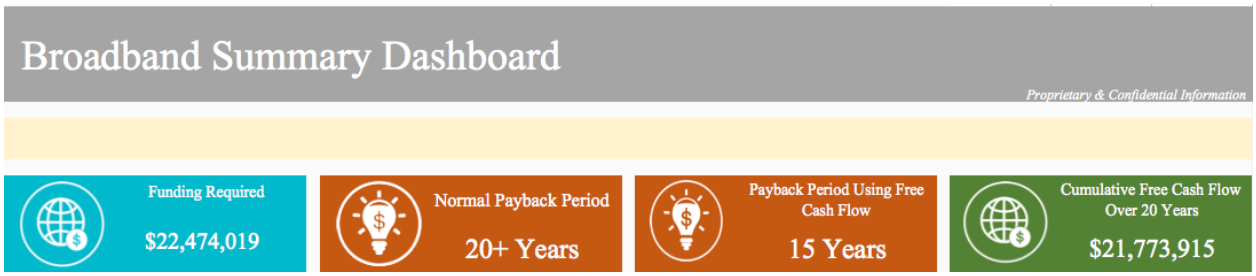
[2] Customer Premise Equipment - Any terminal and associated equipment located at a subscriber's premises and connected with a carrier's telecommunication channel at the demarcation point ("demarc").

FIGURE 2: PROJECTED REVENUES-COMMUNITY ANCHOR AND WHOLESALE BUSINESS



Using the model's stated assumptions, and as outlined below in
Figure 3, the Stark Community Broadband Network will require $22.5 million in funding, and can be financially sustainable over the long term with the right project execution. The revenue model covers all operating and capital requirements, debt service, and funding of necessary reserve balances. The model projects Cumulative Free Cash Flow of nearly $22 million over the initial 20 Years. All financing instruments have been assumed at 20-year with 4% interest. Given these assumptions the network has an accelerated payback period of 15 years using excess free cash flow. This payback can be rapidly escalated as can increased system revenues with broader use of the network.

FIGURE 3: SCBA DASHBOARD



It is our opinion, that Stark County should take prudent steps to form partnerships and alliances where possible and to make strategic investments in these network assets once the proper governance, business, and financial models have been agreed to by all participating parties. These financial models are sensitive, and can be used to provide various levels of analysis around the sensitive points – service rates, uptake, and operating structures.

CONCLUSIONS AND NEXT STEPS

Stark County must build consensus amongst the community and potential partners to develop final details beyond this Study. There are many answers that will have to be answered once the stakeholders are educated on the options. Magellan's recommendations outlined in this action plan are to provide the group guidance to what process is used to develop consensus and to bring this network to fruition. The Task Team and community leaders will have to begin hosting workshops and developing supporting legislature to move this project forward. A good debate will ensue. Armed with the knowledge of what is possible, at what cost, and how these recommendations should be carried out, the Task Team and County can begin to move this process forward by taking strategic steps and making wise investments. With a business case, the County and its partners must understand the opportunity before them, and understand the basic concepts and benefits that this network will bring to the community. The community will have to support this project – at all levels – giving the necessary "buy in."

The following tasks must be accomplished:

1. Finalize project partners (school district, county, cities and townships, healthcare providers)
2. Develop consensus on governance structure
3. Identify funding opportunities and loan requirements
4. Finalize site selections for facilities to be connected
5. Finalize fiber-optic routes
6. Identify potential last-mile projects and partners to develop a proof of concept
7. Perform a Design & Engineering Study to develop actual construction plans and engineers estimates for construction
8. Determine network components, systems, and data center requirements
9. Develop Business and Implementation Plans
10. Move into implementation

Appendix A: Glossary

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-Dieletric 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 Institutions	The National Telecommunications and Information Administration defined CAIs in its SBDD program as "Schools, libraries, medical and healthcare providers, public safety entities, community colleges and other institutions of higher education, and other community support organizations and entities". Universities, colleges, community colleges, K-12 schools, libraries, health care facilities, social service providers, public safety entities, 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 less 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).
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. This has been overtaken by 4G LTE.
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 Rock Falls, and U.S. territories.
FDH – Fiber Distribution Hub	A connection and distribution point for optical fiber cables.

FTTH – Fiber to the Home	A fiber-optic system that connects directly from the carrier network to the residential premises.
FTTN – Fiber to the Node	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 FTTB – 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.
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.
Last Mile Infrastructure	Facilities used to provide broadband service between end-user (including residences, businesses, community anchor institutions, etc.), equipment and the appropriate access point, router or first significant aggregation

	point in the broadband network. Or specifically, the connection between the end user and the network provider's equipment.
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 copper wire connection; but in many areas it has transitioned to fiber optic. Also, 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.
Middle Mile Infrastructure	The list of interconnection points between the service provider and the Internet backbone. These connections are capable of very high bandwidth, speeds, and capacities and may be service assured.
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.
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	The practice of 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.
PPP – Public-Private Partnership	A Public–Private Partnership (PPP) is a government service or private business venture that is funded and operated through a collaborative partnership between a government and one or more private sector organizations. In addition to being referred to as a PPP, they are sometimes called a P3, or P^3.
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, which are reflected in Service Level Agreements or SLAs. 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. Formerly known as "REA" or the Rural Electrification Administration.
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.
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.
Steaming	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 Element	Leased portions of a carrier's (typically an ILEC's) network used by another carrier to provide service to customers. Over time, the obligation to provide UNEs has been greatly narrowed, such that the most common UNE now is the UNE-Loop.
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.
VoIP – Voice over Internet Protocol	An application that employs a data network (using 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.