OCTOBER 2022

LAKE COUNTY, FL

Broadband Feasibility Study

Deliverable 1
Review of the Current Environment

Magellan

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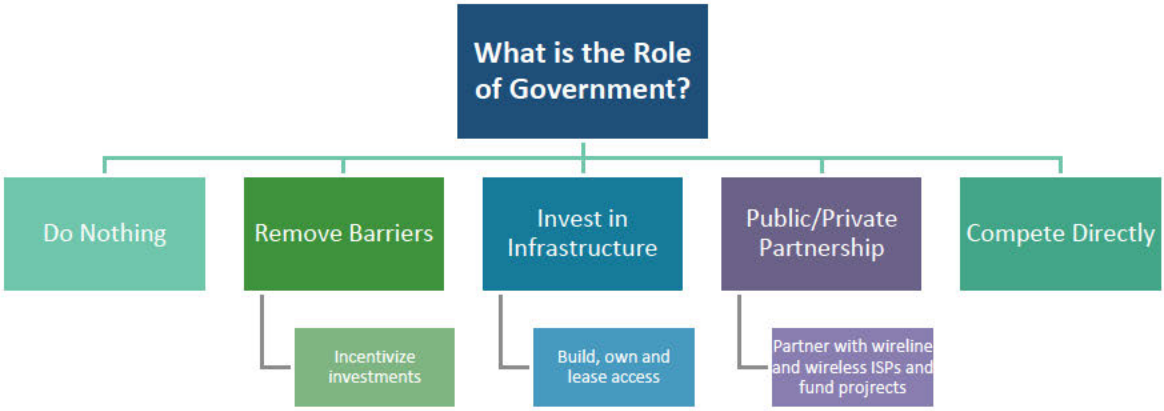
Executive Summary

Over 3,000 communities in the US have invested in fiber networks to support internal government operations and to fulfill greater requirements across their areas. In doing so, they have been able to expand this fiber to support connections to County and City facilities, providing fiber access to schools, and connecting traffic signals, streetlights, and public safety cameras.

In some cases, municipalities and county governments have expanded their fiber to increase access to high-speed internet services in areas where existing broadband services do not meet one of the four dimensions of internet service, which include speed, reliability, customer service and/or affordability. Economic development has been a major beneficiary of this strategy as the small and medium business sectors are generally the largest contributor to an area's economy yet are challenged to find affordable high-speed internet services. Education, healthcare, transportation, and housing have also benefited from new access to broadband services, enabled by these organizations. And some communities have crafted their own policies to consider internet access a utility, like electric and water. In doing so, these communities have built their broadband networks to reach all citizens and businesses throughout their jurisdictions.

Today's post-COVID acknowledgement of the importance of connectivity and high-quality Internet services is driving significant investment across the US. The US Federal government (as further detailed in this report) in 2020, 2021 and through the next several years is making historical investments in broadband to ensure every corner of the country is connected, and no one is left behind. In fact, since CARES funding of 2020, hundreds of billions of dollars has and is being made available to states, counties, cities, tribes, and regions to deploy new infrastructure and services meeting higher thresholds than the FCC's broadband definition of 25 Mbps download, 3 Mbps upload.

Communities, such as those Lake County consists of, have used differing techniques to expand broadband, from making fiber available to local providers through lease agreements, to developing public-private partnerships, to delivering high-speed internet services themselves. Each community must decide for itself the role it wants to play in driving broadband investment, depending on its unique local issues, available funding, tolerance for risk, capabilities to compete and desire for overall control. About 500 municipal utilities, local governments and cooperatives play a role in expanding broadband directly within their communities today.



Lake County has several options to consider as it determines its role in furthering broadband expansion across the County. That includes doing nothing, removing barriers, investing directly in infrastructure, or structuring a public private partnership (P3/PPP), or even competing directly with the private sector. Florida State law dictates what local governments can and cannot do as it relates to broadband deployments throughout the State – this will drive the range of options for the County to consider.

The concept of ***Do Nothing*** is to accept the fact that residents and business in the County will have to live with what they have despite the limitations of services available.

Lake County can ***Remove Barriers*** to private sector investment. This is an effective and low-cost strategy to incentivizing further expansion. Some items the County could focus on includes reducing permit fees for fiber and tower construction, as well as simplifying permit requirements, incentives to developers to install conduit in new residential and commercial developments, and by identifying areas of need and demand and sharing that with providers.

Lake County can make ***Direct Investments*** in broadband infrastructure (conduit, fiber, towers) and make that infrastructure available to the private sector providers via standard lease agreements to generate revenues from its investments.

The County could pursue a **Public-Private Partnership (*PPP/P3*)** arrangement with technically and financially viable service providers – both wireline and wireless. The County could develop and structure a grant program targeted to regional providers who would use grant funding to deploy and operate new broadband infrastructure in the areas identified by the County as priorities.

The County could also choose to **Compete Directly** with the areas' private sector providers, as a retail ISP, using its funding to build, own and operate its own last-mile networks in the identified areas. Florida State Statute 350.81 creates barriers for Lake County to be able to do this effectively. This option can also create legal risk to the County as it is likely to draw concerns from the County's incumbent providers.

Lake County commissioned this Broadband Feasibility Study to evaluate the broadband gaps and opportunities to enhance broadband services across the County, and to determine Lake County Government's role in accelerating broadband deployments in areas that are unserved or underserved as defined by the US Federal government. Lake County understands the significant opportunity ahead of it given the substantial federal and state funding which will be made available to help close the Digital Divide in and across the County once and for all.

Magellan, a broadband development firm that provides broadband planning, engineering, and implementation and who has worked with over 400 municipalities in the US, was hired by Lake County in May 2022 to perform this Study.

FLORIDA DEO BROADBAND PLANNING AND DATA COLLECTION

The Department of Economic Opportunity's (DEO) Florida Office of Broadband (FOB) works with local technology planning groups, local and state government agencies, community organizations and private businesses on broadband planning to increase the availability and effectiveness of broadband internet throughout the state, specifically in small and rural communities. Through these collaborations, the Office of Broadband encourages investment in grant funding opportunities for the broadband program that focus on the expansion of broadband.

"The Florida Broadband Deployment Act of 2021" (HB 1239) added significant broadband planning provisions to the Office of Broadband's broadband planning duties and became effective July 1, 2021. The FOB was originally created for the "purpose of developing, marketing, and promoting broadband Internet services in this state" and creating a strategic plan "for increasing the use of broadband Internet service in the state."[1] The Act adds further objectives to be included in an updated Strategic Plan:

> Create a strategic plan that has goals and strategies for increasing and improving the availability of access, and use of broadband Internet service in the state. In development of the plan, the department shall incorporate applicable federal broadband activities, including any efforts or initiatives of the Federal Communications Commission, to improve broadband Internet service in this state. The plan must identify available federal funding sources for the expansion or improvement of broadband.[2]

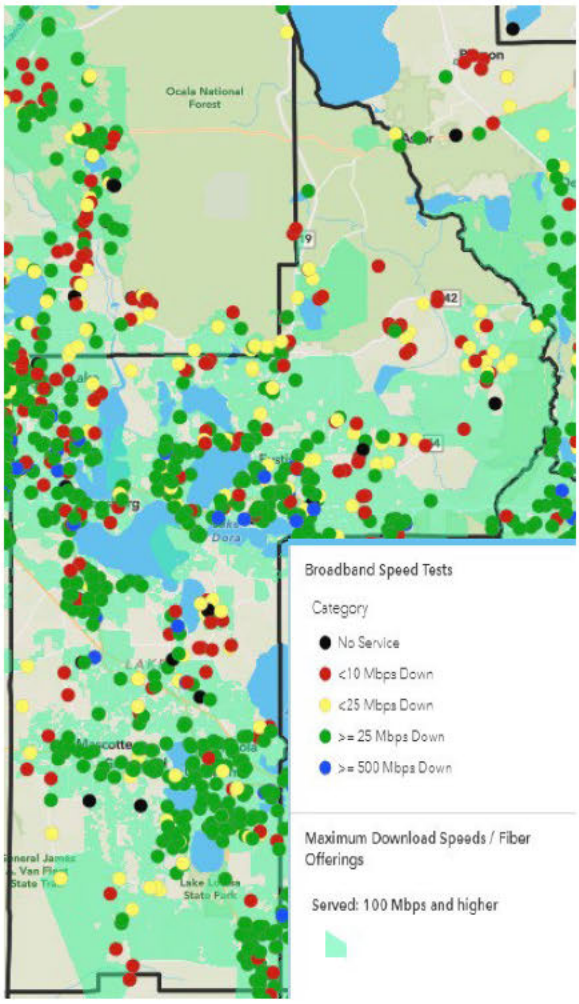
[1] F.S. 288.9961 (4) and (4)(a)
[2] F.S. 288.9961 (4)(a)

The Strategic Plan was submitted to the Governor and Florida Legislature in June 2022, and is publicly available at https://www.floridajobs.org/docs/default-source/community-planning-development-and-services/broadband/the-florida-broadband-strategic-plan.pdf.

In September 2022 DEO's Office of Broadband published its notice of proposed rulemaking to the Florida Administrative Register and the final application and evaluation criteria[3] for the ***Broadband Opportunity Program*** on its website[4]. The program will commence its 30-day application window on November 2, 2022.

In the meantime, DEO developed Florida's Broadband Availability Map to identify broadband internet service availability throughout the state. The Broadband Availability Map identifies a location's speed, connectivity and access to broadband services using surveys and crowdsourced data.

Figure 1 - DEO's Broadband Availability Map for Lake County[5]



[3] Scoring and Evaluation Criteria for the BOP - https://www.floridajobs.org/docs/default-source/community-planning-development-and-services/broadband/broadband-opportunity-program-scoring-and-evaluation-criteria.pdf
[4] https://www.floridajobs.org/community-planning-and-development/broadband/office-of-broadband
[5] https://expressoptimizer.net/projects/Florida/speedtestmap.php

PROVISION OF MUNICIPAL BROADBAND IN THE STATE OF FLORIDA

Regulatory and legal hurdles in the State of Florida would make it very difficult for Lake County to initiate provision of retail broadband services. Lake County is not a grandfathered entity as defined under Florida Statute 350.81. (F.S. 350.81 was enacted in April 2005 and contains a waiver provision which excepts cities and counties that were providing telecommunications services prior to that date, from most of the requirements.) Thus, the County would be required to comply with all the steps and requirements as outlined in the statute, which are onerous. These requirements include:

- At least two public hearings with specifically prescribed notice provisions.
- Specifically prescribed content for the public hearings including factors that can be difficult to demonstrate since the information is held by the broadband providers themselves such as details on where service is or is not available, where service providers plan to provide service, etc.
- Provision of data showing "the private and public costs and benefits of providing the service by a private entity or a governmental entity, including the effect on existing and future jobs, actual economic development prospects, tax-base growth, education, and public health" which no other provider must gather or defend to provide service.
- Provision of a written business plan in public showing details, which again no other provider must publicly disclose to provide service, which provision provides a road map to existing service providers to stunt the success of the initiative.
- Provision of "a plan to ensure that revenues exceed operating expenses and payment of principal and interest on debt within four years which no other provider must create or publicly disclose.
- Required findings for vote by the Commission or Board.
- Annual review of operations in a formal public meeting.
- Restrictions on bonding for capital costs including referendum requirements.
- Public hearing if revenues do not exceed operating expenses and payment of principal and interest after four years with mandated decision on four specific options.

Since fiber-to-the-home (FTTH) projects, whether public or private, often require longer than four years to become cash-flow positive, this last requirement alone either precludes municipalities from proposing FTTH projects or invites endless disputes over whether a municipality's plan is viable, and subject municipal business planning to delays and publication of business information that no other business would be required to accept.

The County likely has willing partners also willing to engage in further expansion of their services given potential grant funding available through the County directly, or through other grant programs currently in development.

Lake's Base Maps and Telecommunications Environment

(a) County Point of Interest Map

County sites and facilities, city facilities, libraries, schools (both K-12 and higher ed) and public safety sites are all candidates to be connected to a County wide middle-mile of fiber-optic backbone network. As indicated in Figures 2 and 3 below, there is a significant number of public facilities and locations throughout the County, depicted to provide a frame of reference in the County.

Figure 2 - County Point of Interest Map – Community Anchors

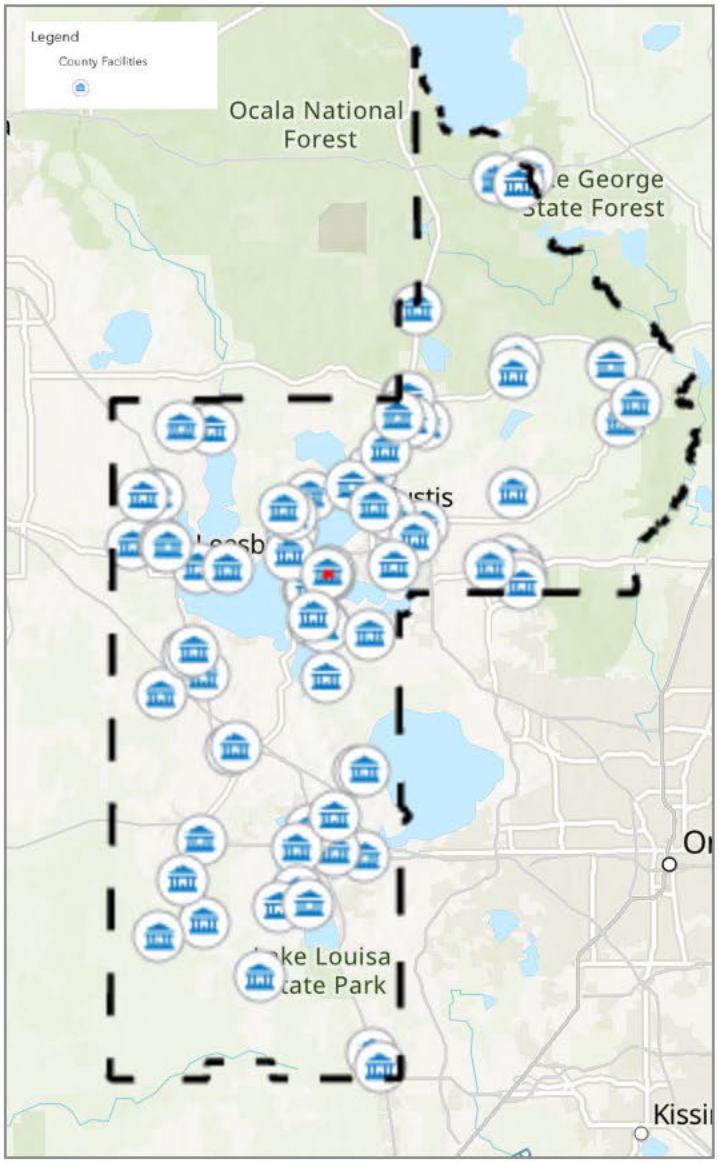
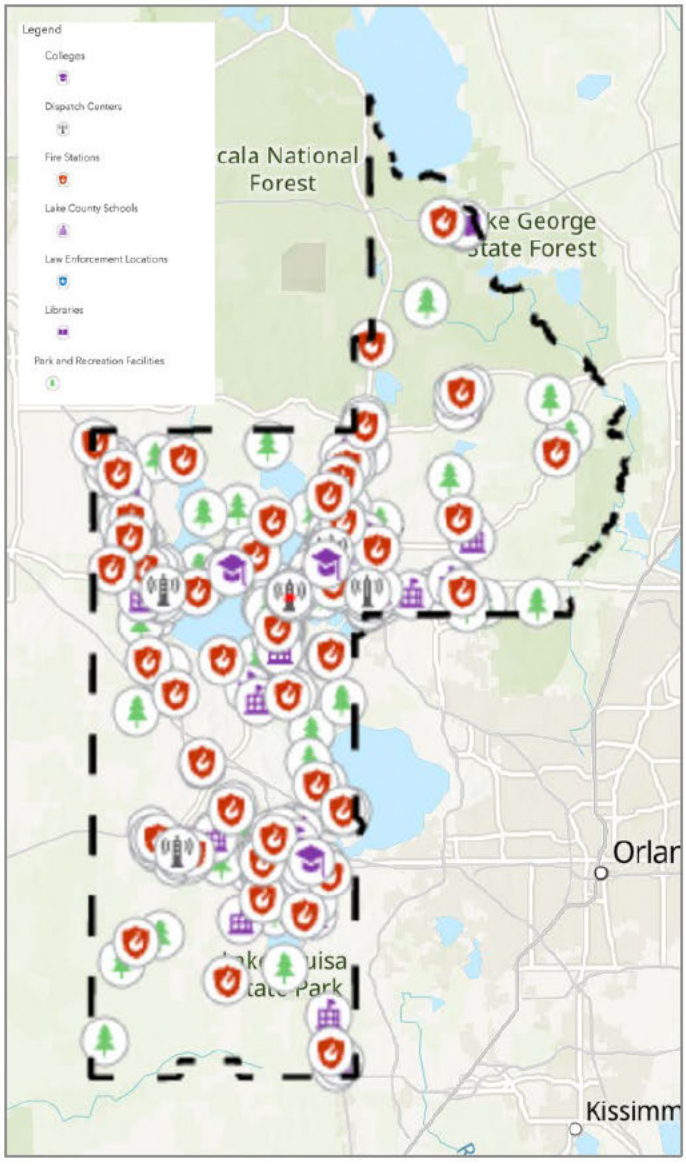


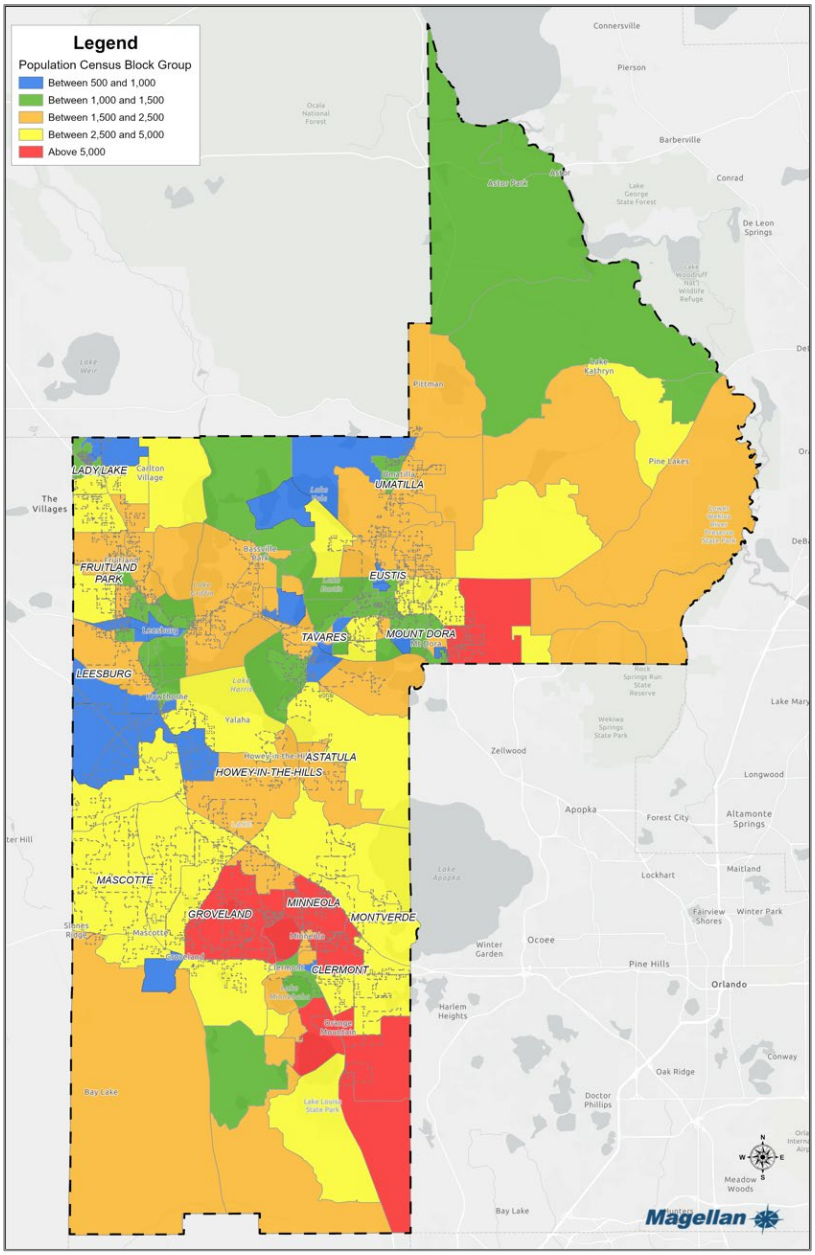
Figure 3 - County Point of Interest Map – County Facilities



(b) Population Density

The following map details the population density throughout the County, by census block. Density of a given area, like a census block, can be helpful when determining what technologies and infrastructure make sense and are most appropriate for areas of the County. In areas of dense population, fiber distribution infrastructure to support FTTH (fiber to the home) can usually be supported, while areas of low density, like in more rural locations, are best suited for a wireless terrestrial-based service.

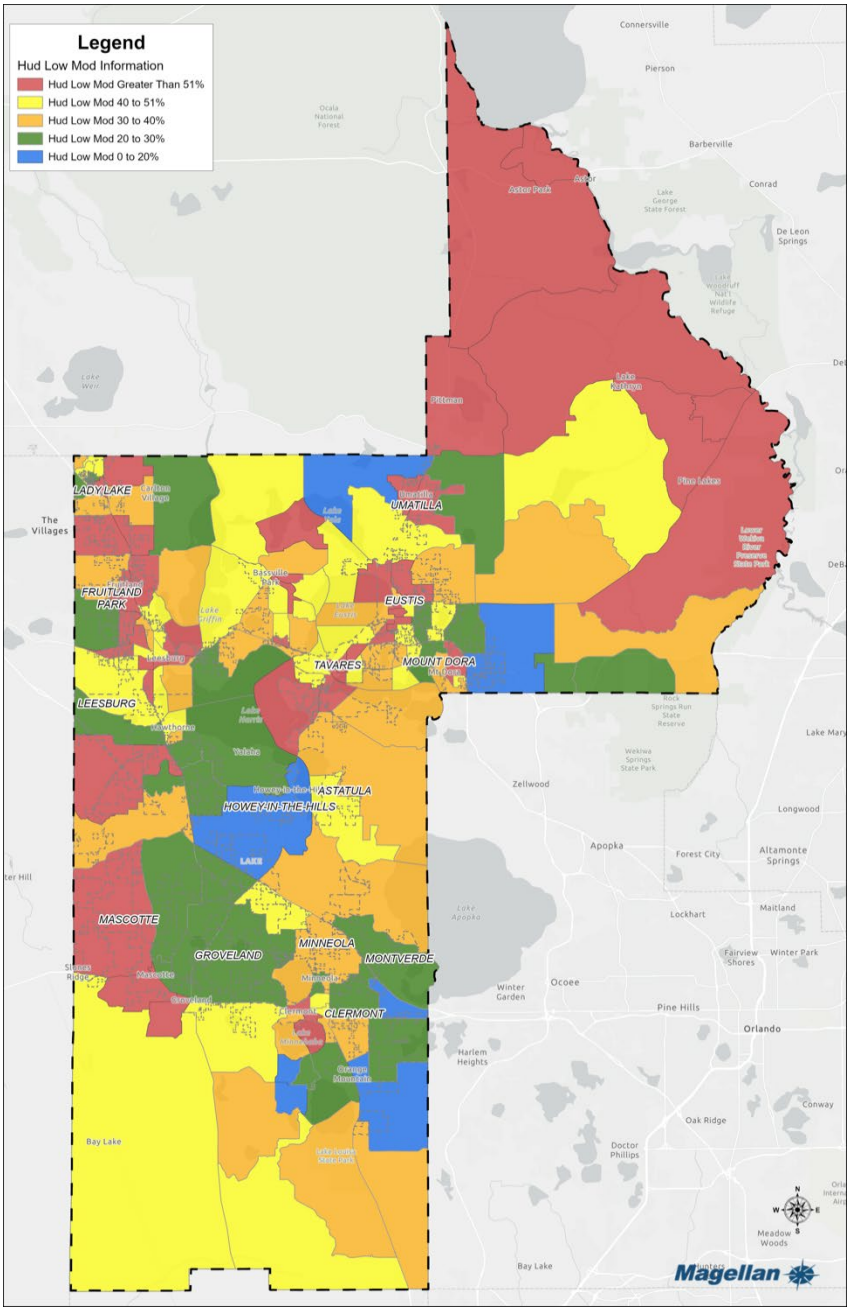
Figure 4 - County's Population Density Map by Census Blocks



(c) HUD/Low Income Eligible Areas

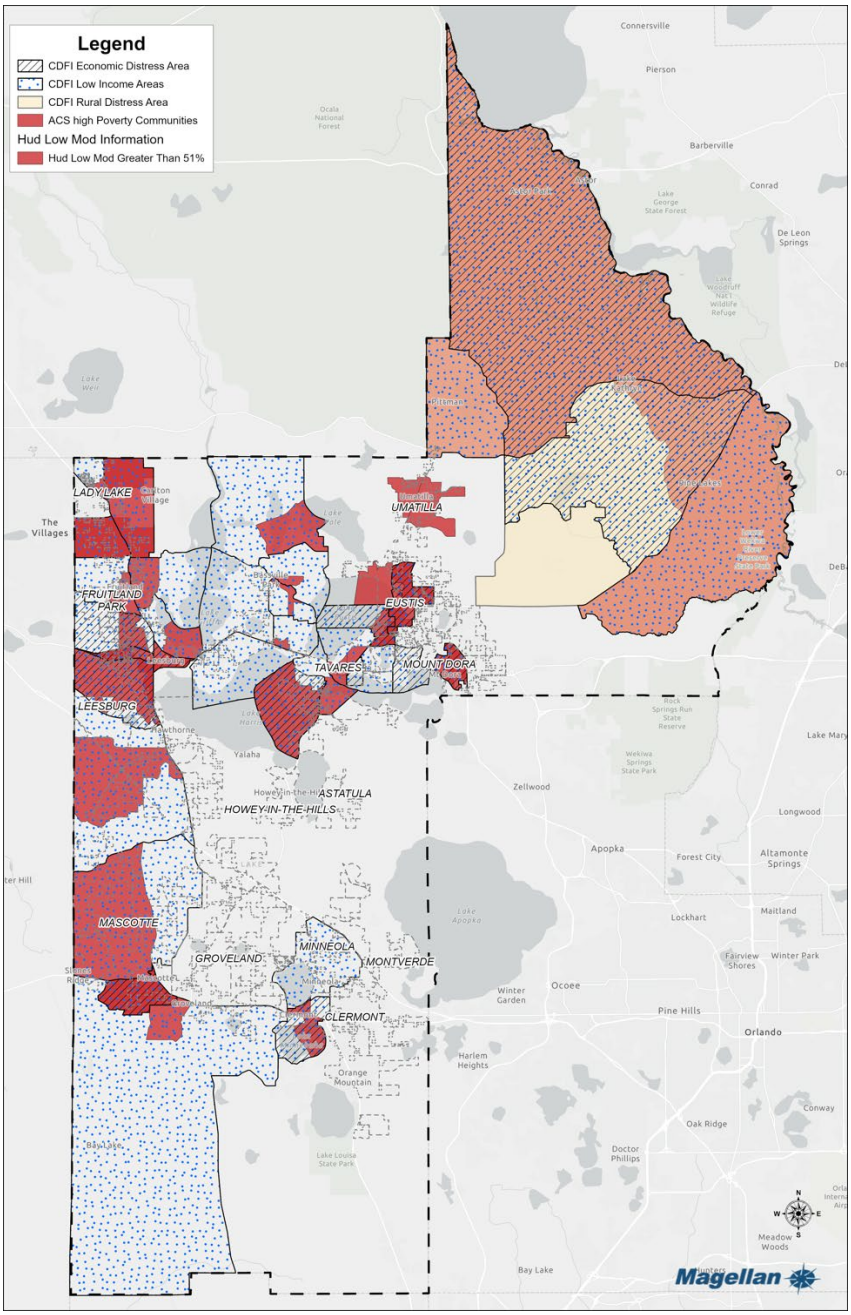
U.S. Department of Housing and Urban Development (HUD) data is utilized to determine areas that may be eligible for support based upon Low and Moderate Income (LMI) statistics. HUD-eligible areas can qualify for CDBG funding to support telecom infrastructure projects and are generally likely to include significant low-income and at-risk populations. The map below indicates the entire range of Low/Mod statistics. For an area to be eligible, we generally focus on areas with greater than the 51% Low/Mod indicator.

Figure 5 - HUD/Low Income Eligible Areas Map by Low-Mod Percentage



The map below indicates specific eligible areas given the Low/Mod indicators, and identifies high-poverty communities, economically distressed areas, low-income areas, and rural distress areas.

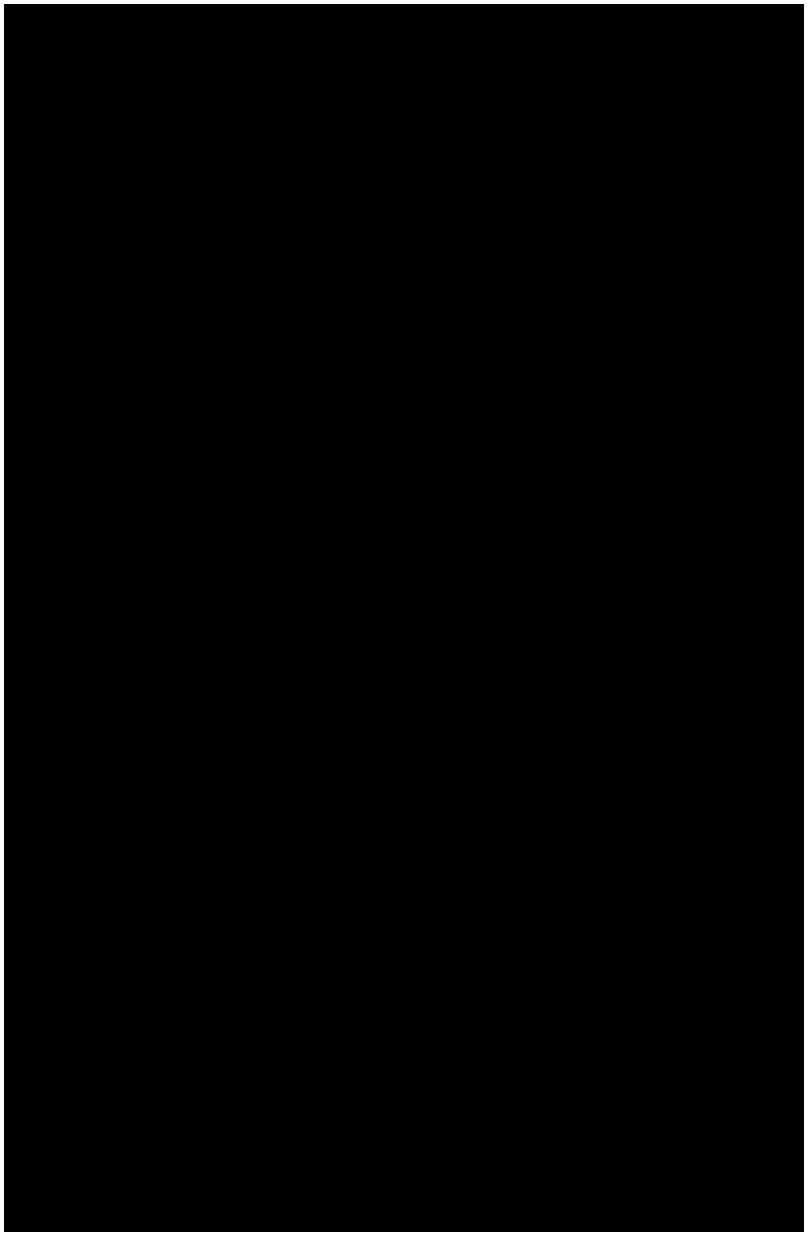
Figure 6 - CDBG Funding Eligible Areas Map



(d) Towers in Lake County

Magellan was able to identify publicly-owned and privately owned towers throughout the County which are depicted in the figure below. Tower data is collected from numerous sources including FCC databases, County data, and other public and commercial data sources. The FCC database usually includes most towers that are in a locality, and generally includes all or nearly all cellular towers. The tower ownership database is not always updated in a timely manner. Towers are generally either publicly owned or privately owned. Publicly owned towers are typically owned by City or County agencies deployed for public safety purposes.

Figure 7 - Lake County Towers Map by Ownership



The table in Appendix 1 provides details on each tower's owners and locations. Height, street address and Lat/Long coordinates are also included.

(e) Fiber Routes in the County

Magellan reviewed and accessed both publicly available sources, as well as subscription-based services to identify the fiber routes within the County. Some telecom providers simply do not share their route data. Major fiber providers are listed below. AT&T, Century Link and Level 3 have "long-haul" fiber routes passing though Lake County. Metro Routes connect local business and provide access to residential providers. Century Link and Level 3 Metro are the major Metro providers in Lake County.

Figure 8 - Lake County's Long-Haul Fiber Routes by Provider

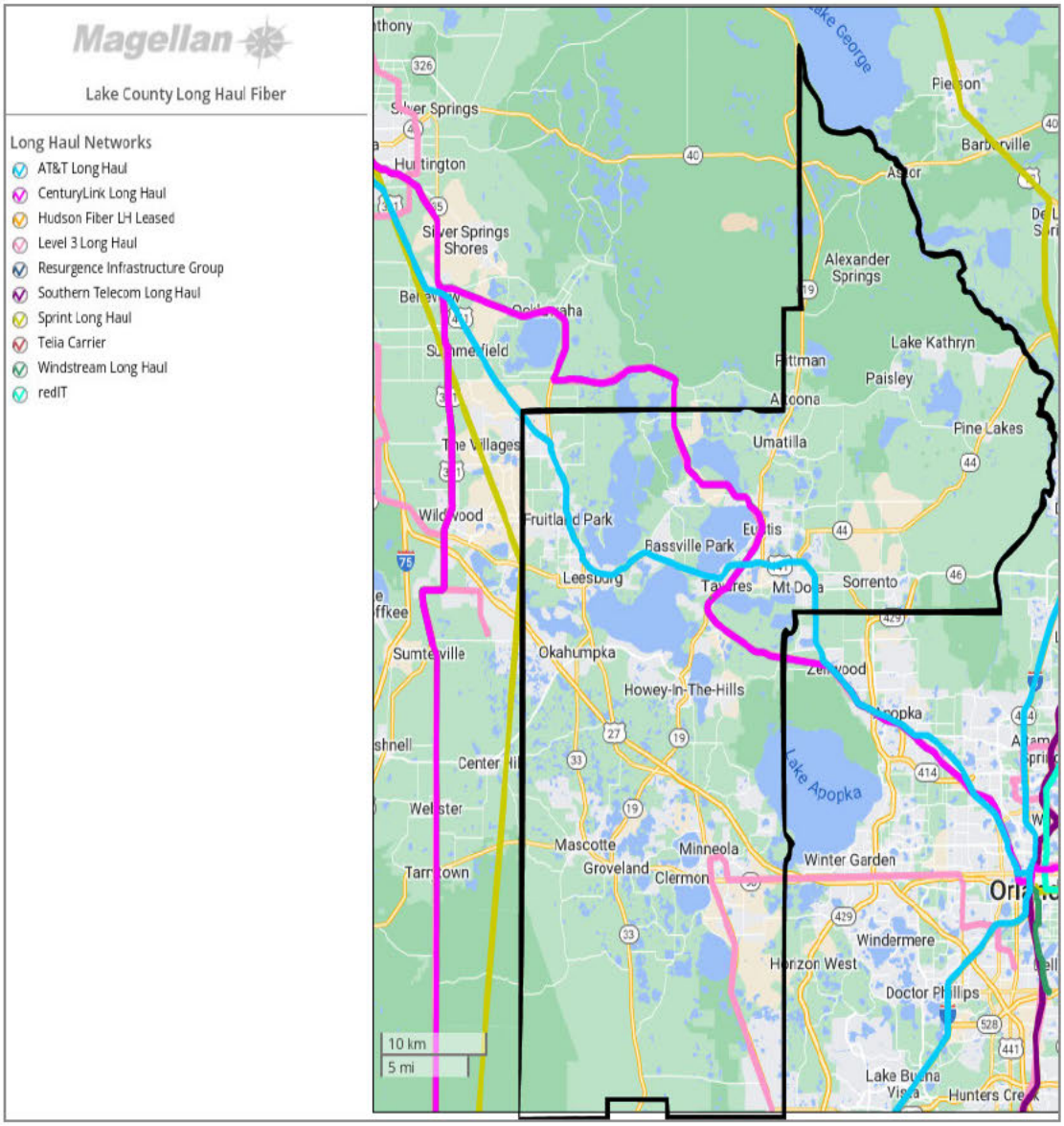
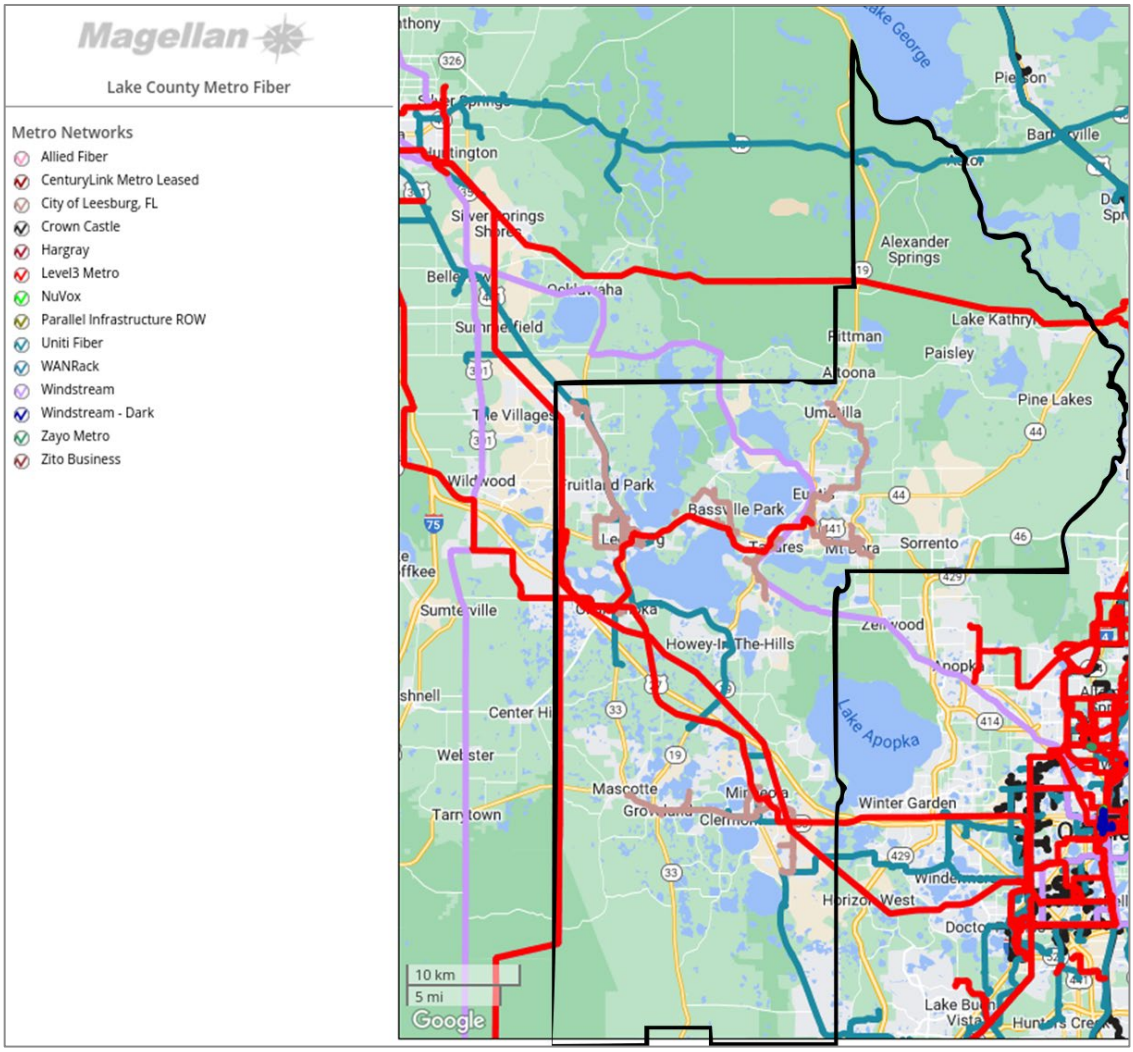
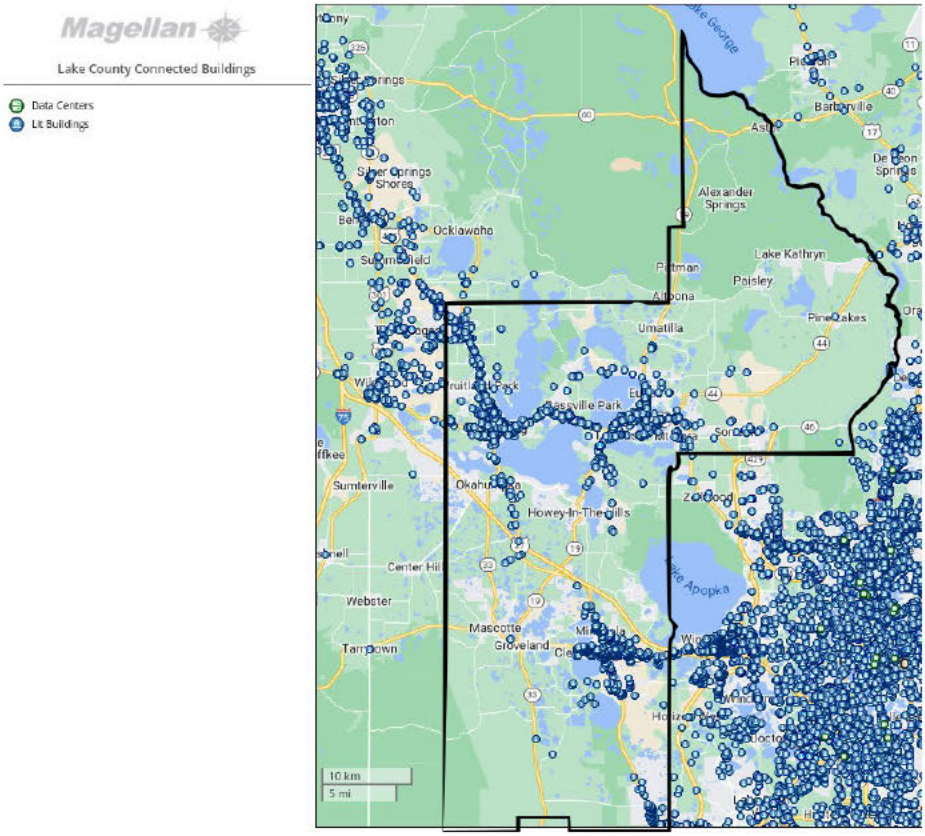


Figure 9 - Lake County's Metro Fiber Routes by Provider



The map below shows network connected buildings in the area. Lumen lists the most buildings, with Xfinity as having second most. Lumen shows DSL and fiber connected buildings. Xfinity shows hybrid fiber coax connected buildings. It should be noted that the northeast and southwest have very few connected buildings. City of Clermont, City of Mount Dora and City of Fruitland Park have the most connected buildings.

Figure 10 - Fiber Connected Buildings in Lake County by Provider



(f) Served, Underserved and Unserved (477 Maps)

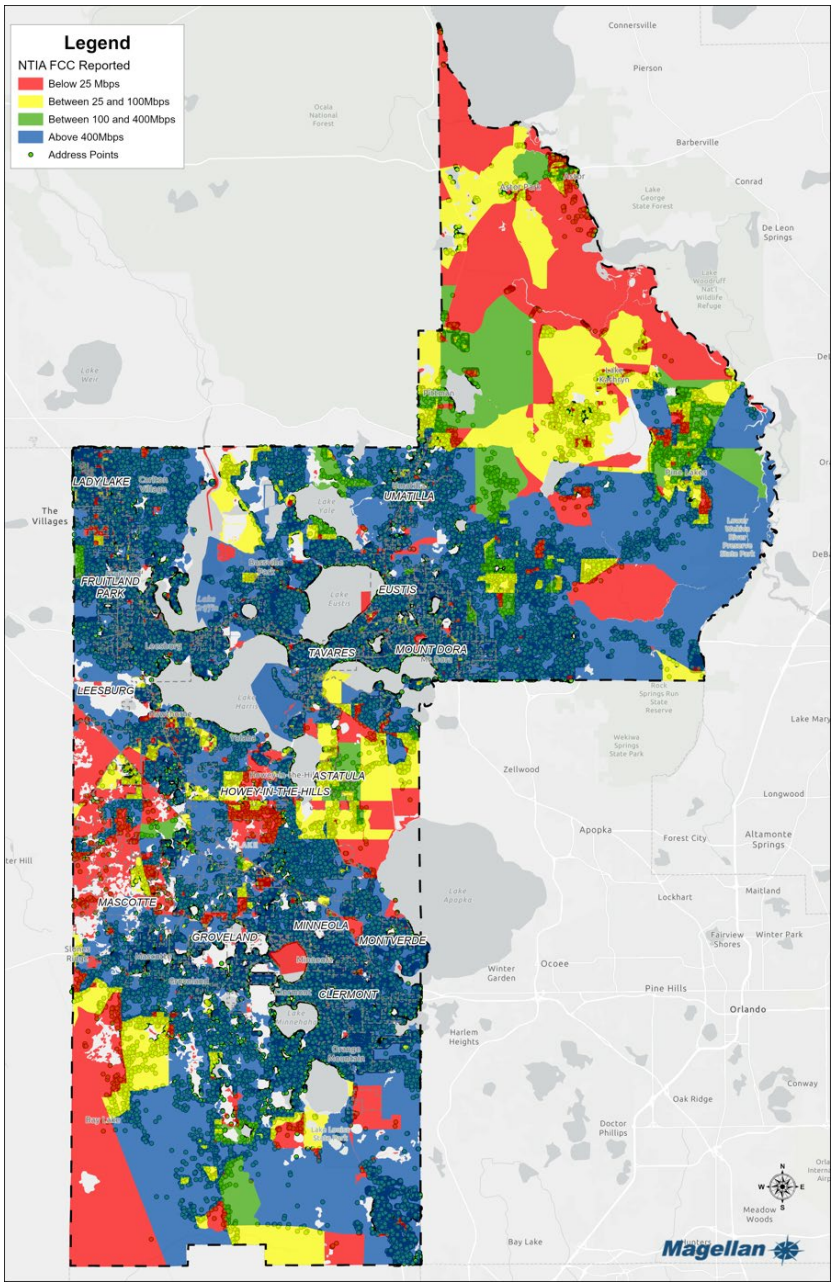
Areas identified below have been rated using the FCC 477 and NTIA data map sets. Service providers including incumbent telephone and cable companies are required to file a 477 report regularly with the FCC to identify where their service is available and at what speed using the current FCC definitions:

Unserved	lacks access to at least 25 Mbps DOWN/3 Mbps UP
Underserved	lacks access to at least 100 Mbps DOWN/20 Mbps UP
Served	at or above 100 Mbps DOWN/20 Mbps UP

Historically, the 477 data have been problematic due to the nature of the reporting, which is self-reported by providers. The providers generally report their best speeds in any given area, not their average, and if a single customer is reported as being served in an area (census block), then it's determined that the entire area is served. The latest 477 data is from 2020.

A newer data source published by NTIA in 2021, further refines the 477 data and incorporates additional metrics and speeds to determine availability.

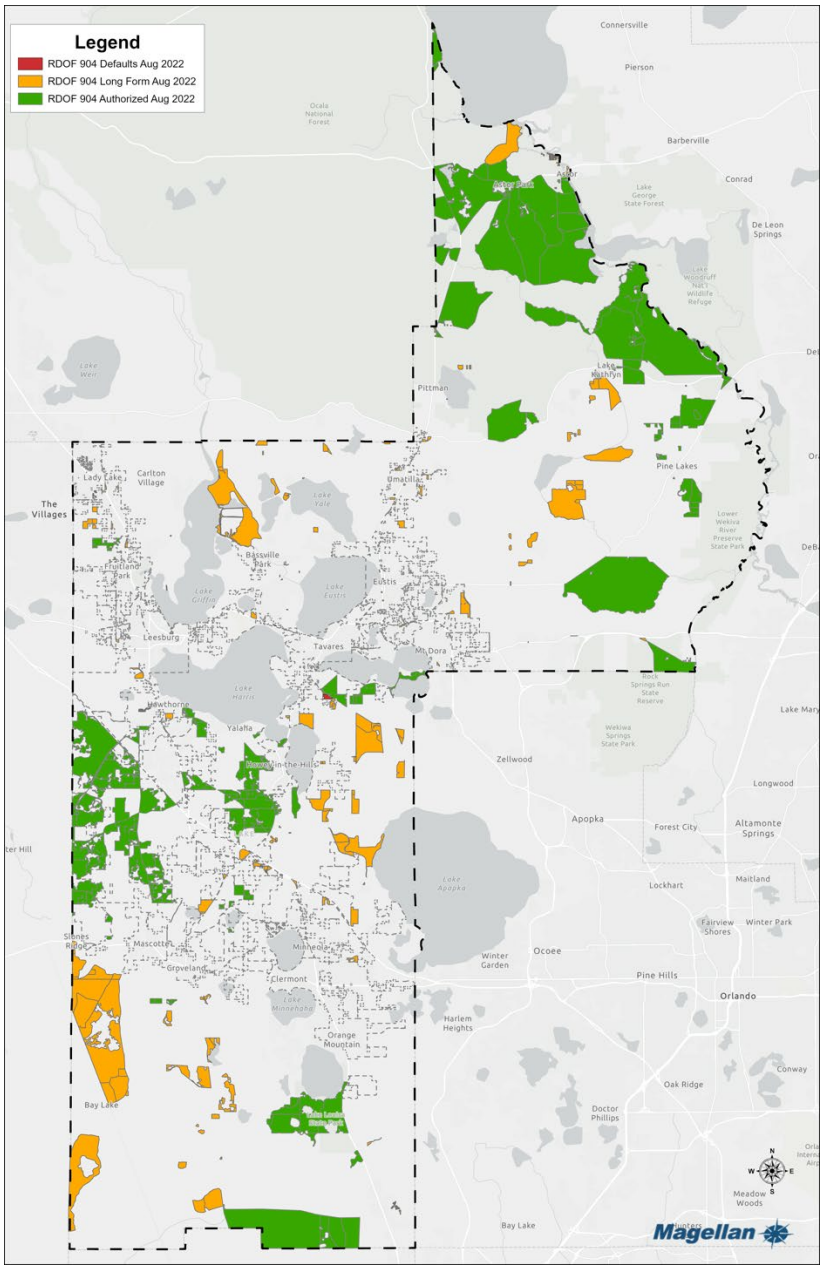
Figure 11 - NTIA Data Map by Maximum Download Speed in Mbps with Address Points



(g) Rural Digital Opportunity Fund (RDOF)[3]

The map below shows the County areas that are eligible for RDOF, and those that were authorized or awarded funds as of August 2022.

Figure 12 - RDOF Eligible and Authorized Areas



[3] https://www.usac.org/high-cost/funds/rural-digital-opportunity-fund/

(h) USDA Rural Utility Services

There are no USDA RUS eligible areas or data available for Lake County.

(i) Cellular Coverage

Magellan used cellular data sources from the FCC 477 maps and OOKLA recorded performance data to assess the coverage and speed of the 3 largest networks in Lake County, FCC 477 maps are shown below for Verizon, T-Mobile, and AT&T. The FCC 477 maps for cellular networks are a recent addition to the FCC performance database. They are self-reported by the cellular carriers and are based on a predictive map using a standard propagation tool. The solid colors indicate at least 5 Mbps/1 Mbps speed levels. This is the result of a propagation simulation; no real test data is provided. All carriers indicate blanket coverage except for the northeastern part of the County. Verizon reports the most coverage, AT&T and T-Mobile show more areas not covered. The fourth map is the OOKLA speed test map which captures actual customer speed test results. The tower location data is overlayed on the speed test results. It agrees with the carrier maps as to areas not covered but gives more granular speed test data. It indicates most areas show speeds below 25 Mbps speeds. This map shows few towers built in the northeastern portion of the county. It also indicates a lack of towers around the City of Mascotte which is one of the more populated areas that have lower throughput.

Figure 13 - FCC's 477 Map of Cellular Coverage Reported by AT&T

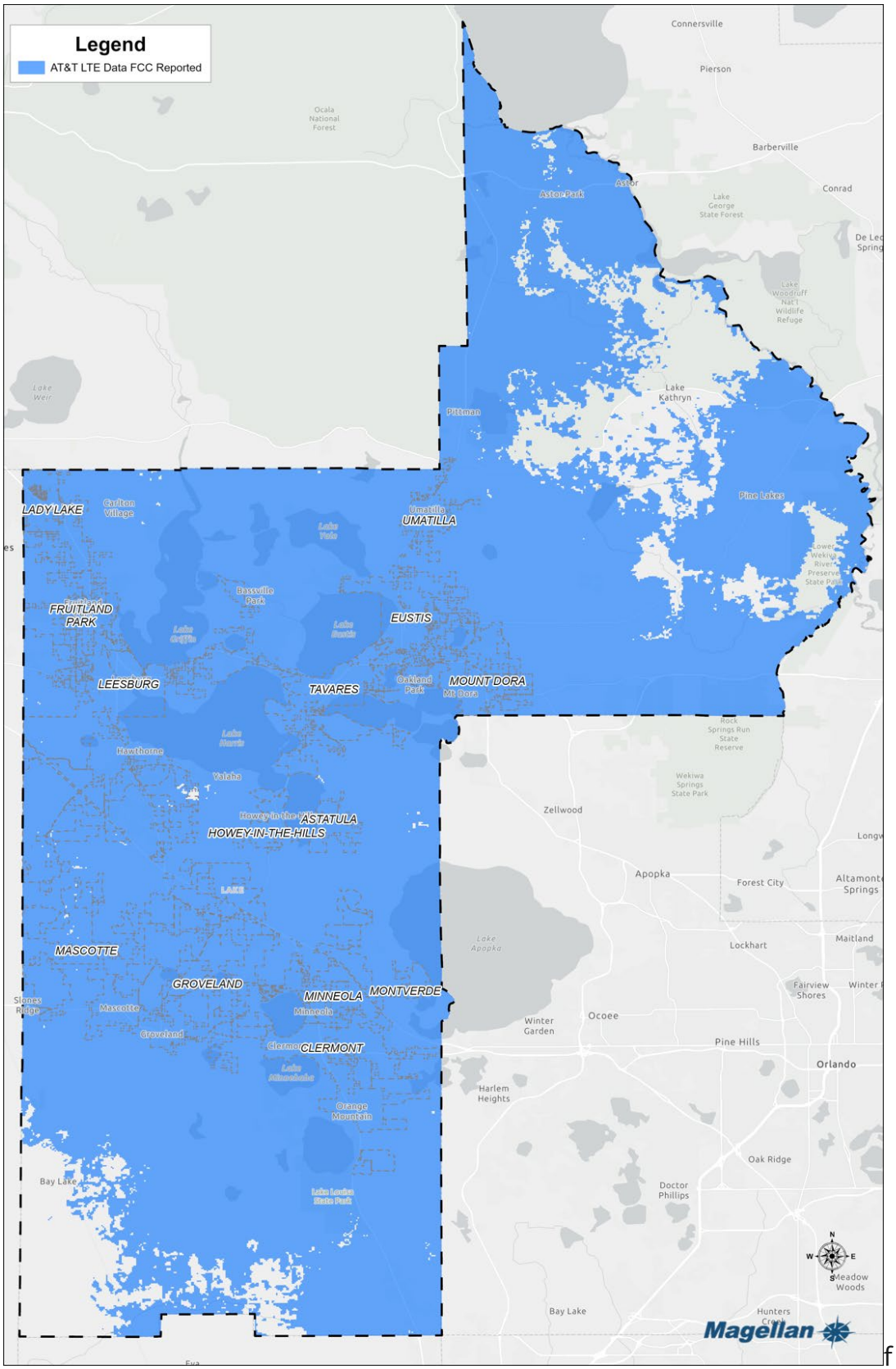


Figure 14 - FCC's 477 Map of Cellular Coverage Reported by Verizon

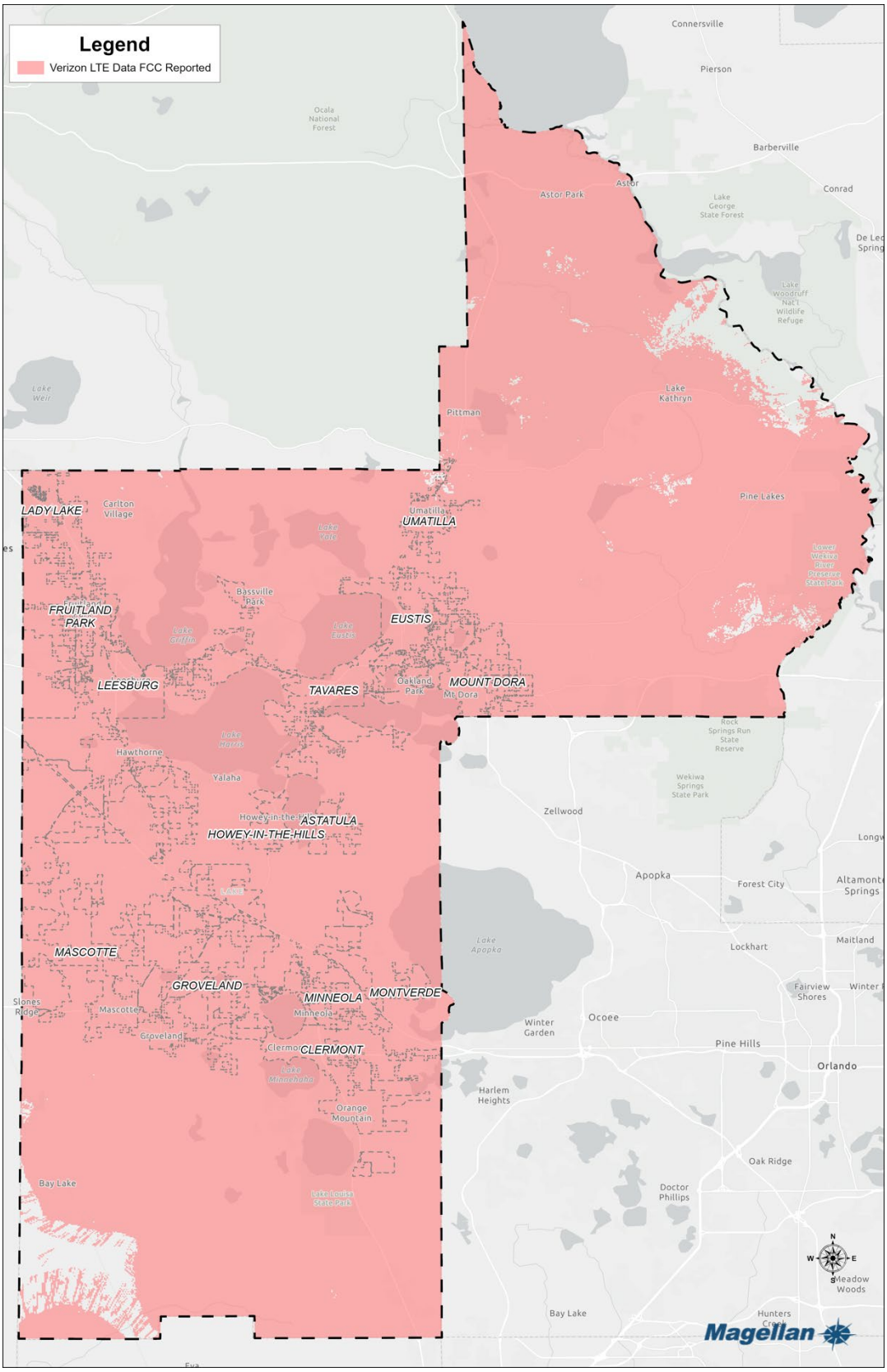


Figure 15 - FCC's 477 Map of Cellular Coverage Reported by T-Mobile LTE

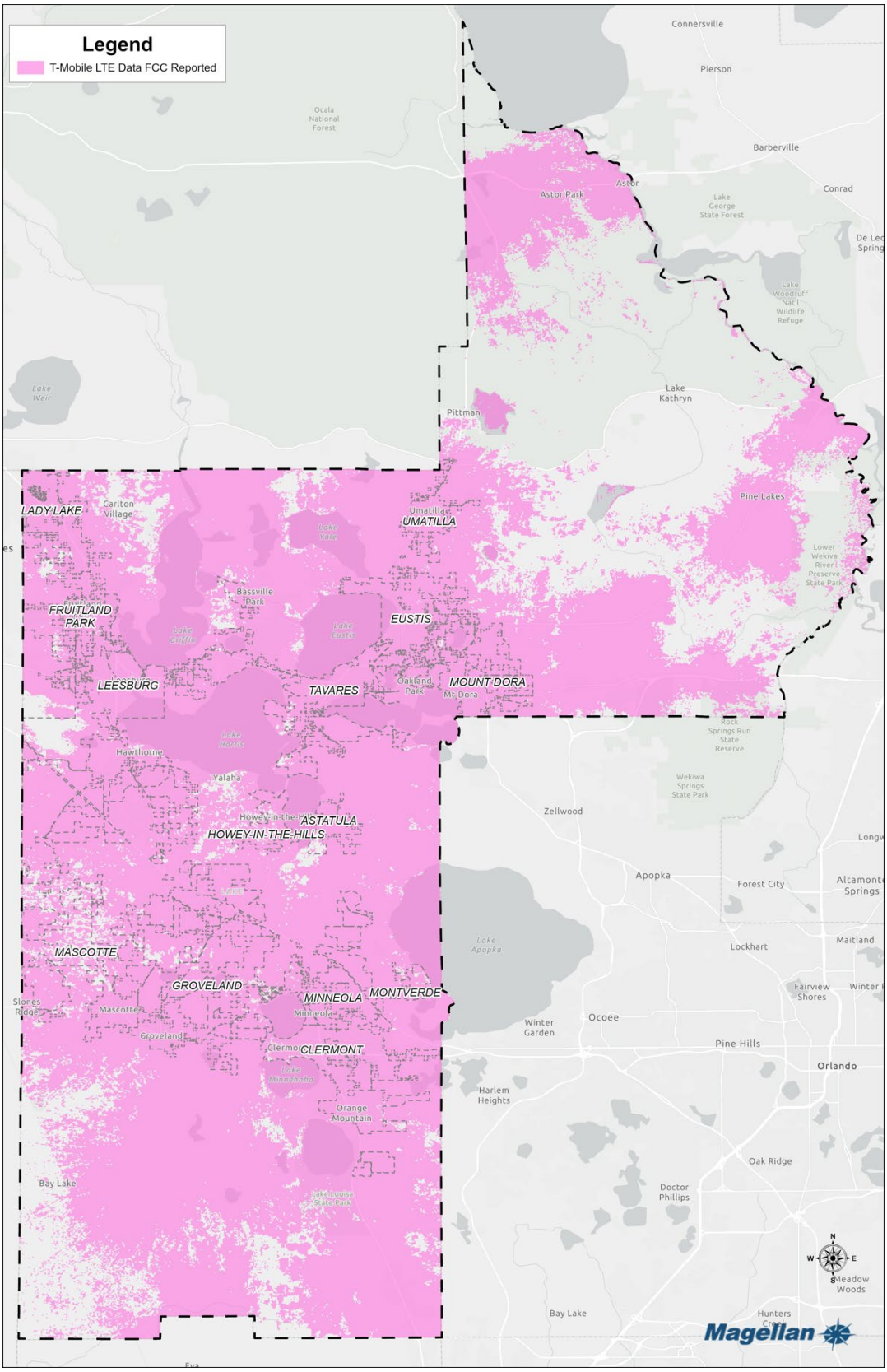
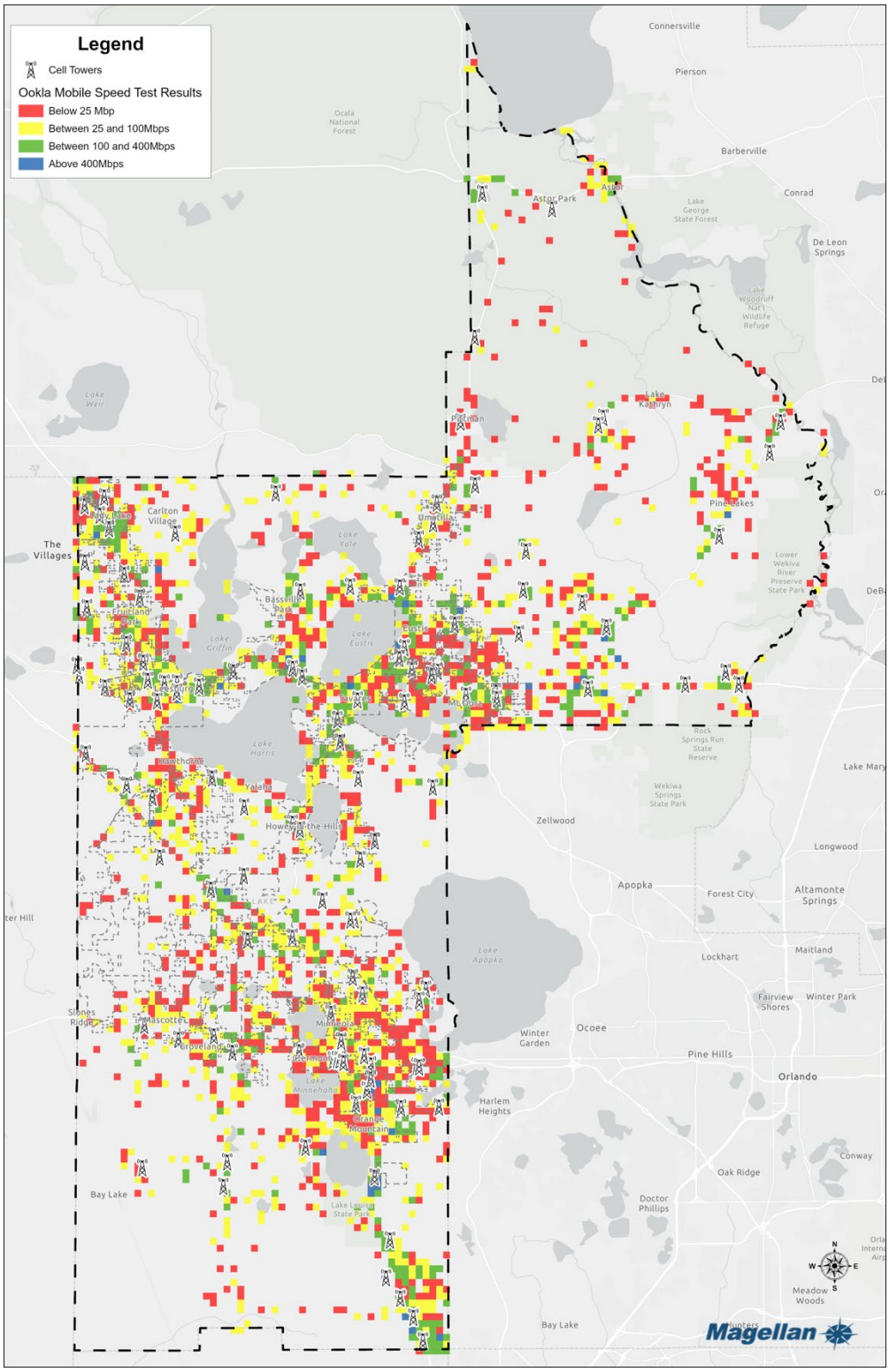


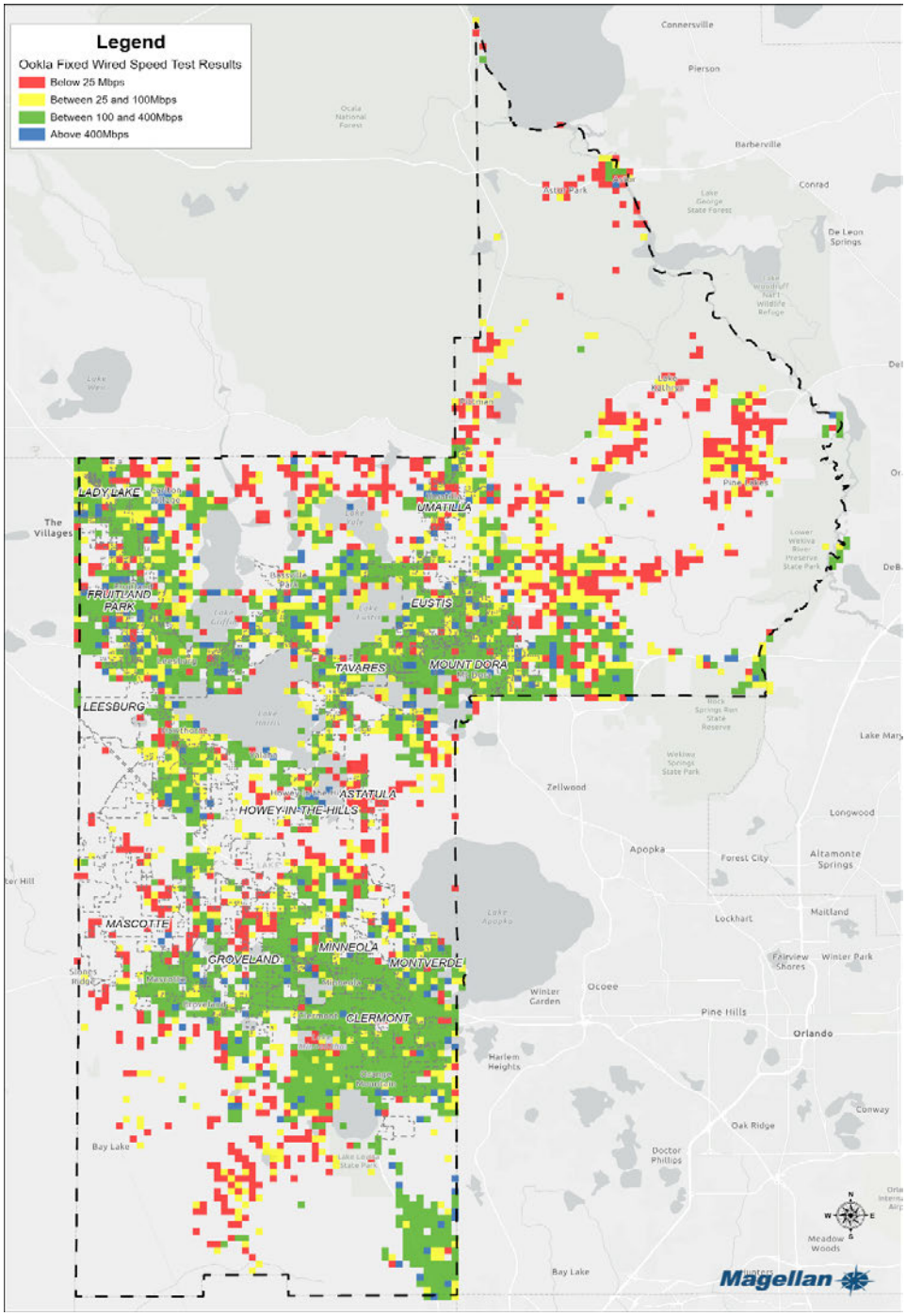
Figure 16 - Ookla's Mobile Speed Test Map by Download Speeds in Mbps with Cell Towers



(j) Fixed Wired Coverage

The map below is Ookla recorded speed test data. The yellow, green and blue blocks are served. The red blocks are underserved. The northeastern portion of the county register's most of these underserved blocks, particularly in the east of the City of Eustis, Lake Kathryn and Pine Lakes. There are also pockets of unserved areas in City of Umatilla, City of Mascotte, Town of Astatula and south of the City of Clermont.

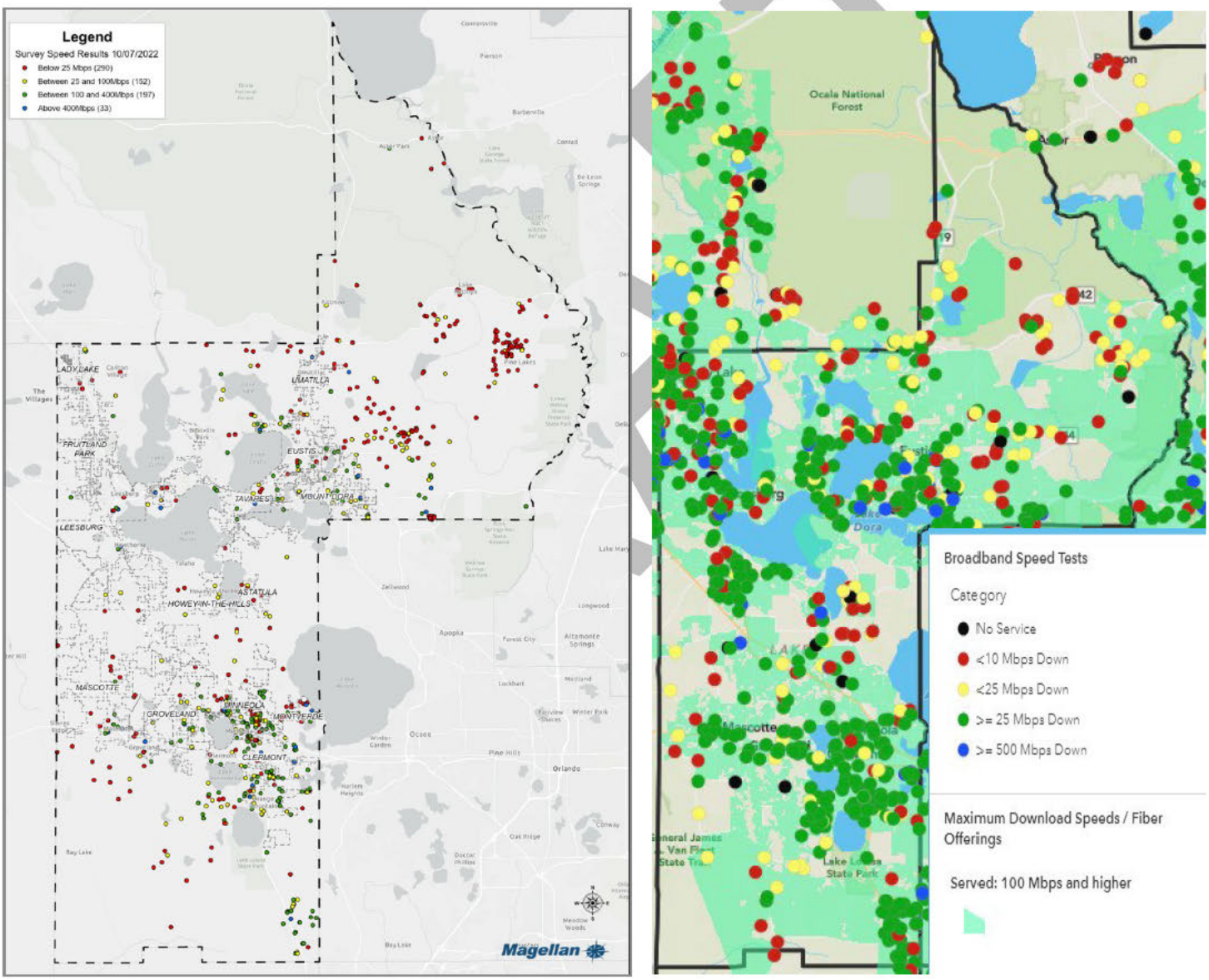
Figure 17 - Ookla's Fixed Speed Test Map by Download Speeds in Mbps



(k) Lake County Consumer Survey and Speed Test

The map on the left below shows the speed test data recorded from the Lake County community survey. The dots shown represent speed test results that are unserved (<25 Mbps) and underserved (25-100 Mbps). The data points are spread all over the county area. The FCC maps show most of these areas as served. The figure on the right is DEO's mapped survey speeds which showed consistency with Lake County's community survey.

Figure 18 - Speed Test Results Comparison of the Lake County Community Survey and DEO's Survey



Market Analysis

The goal of this project is to close the gap between the publicly available data and what needs to be addressed to provide the County's residents, businesses, and anchor institutions more affordable, reliable high-speed broadband options especially for the identified areas of concern detailed in this report. Therefore, Magellan has gathered, verified, and analyzed various data sources on Lake County's level of connectivity by performing a comprehensive market research, survey and stakeholder analysis reported in the sections below.

COMPREHENSIVE MARKET ANALYSIS KEY FINDINGS:

- According to the FCC map, each household has more than one provider option but the higher the speed, fewer providers are available to serve these areas around Lake County. In some cases, no providers are available that offer 100/10 Mbps service. For example, areas in Pine Lakes, Paisley and the City of Mascotte, have only one to no providers that reported a 100/10 Mbps service offering.
- The major internet service providers for residential customers in Lake County are Xfinity, Lumen and Spectrum.
- Lumen is the most widely available service provider in the County for both residential and business customers.
- The major internet service providers for business customers in Lake County are Lumen and Xfinity/Comcast.
- Based on the market research and survey performed for this assessment, the top two widely available type of connections for residential customers are **DSL** and **cable**, while for businesses they have **fixed wireless**, **cable**, and a trend of expanding on fiber offerings among most providers.
- The cost for consumers based on the currently available providers' offerings range from $0.07 (HFC) to $17.00 (DSL) per Mbps.
- There are **underserved and possibly unserved areas** around Lake that are repeatedly identified through different data resources.
    - Base services and speeds are generally available Countywide, but as you seek the higher speed services, the areas of coverage diminish greatly. The FCC map shows that areas like the **City of Mascotte**, **Town of Astatula**, community of **Bay Lake,** and **southeast portion near Lake Louisa** have one to no available providers providing a speed equal to or greater than 100/10 Mbps.
    - Areas of concern that were mentioned several times by different stakeholders are **Town of Howey-in-the-Hills**, **parts of City of Mount Dora, City of Mascotte, City of Groveland, Town of Astatula**, and some areas in the **Northeast part** of the County.

  - The **City of Mount Dora** stakeholders mentioned that cellular coverage was poor in their downtown.
- Areas identified with *Accessibility* Issues were:
  - City of Howey-in-the-Hills
  - City of Tavares
  - Town of Astatula
  - City of Mascotte; especially the migrants and those that are in the agriculture business
  - City of Mount Dora; specifically, the Northeast Community Redevelopment Agency boundary between Limit Ave. and Lincoln Ave and Wolf Branch Innovation District (according to the City's Planning team)
- Areas identified with *Reliability* Issues were:
  - City of Mount Dora; specifically with Verizon and AT&T
  - Town of Astatula; DSL connected through Lumen
  - Astor; DSL connected through Lumen
- Areas identified with *Affordability* Issues were:
  - Town of Lady Lake, Mount Dora; especially for students
  - City of Groveland
- There is an **increasing demand for bandwidth** expressed through the stakeholder outreach sessions and the community survey.
  - Organizations will need more reliable connections as they upgrade their systems and develop better infrastructures for economic growth.
  - 81% of the County citizens said that their need for a higher bandwidth has increased significantly post the COVID-19 pandemic.
- Reliability has been a major concern for non-rural areas in the County and the community survey shows that more than half – 52% of the citizens experience slowdowns daily.
- The median speeds from the survey are 41 Mbps Download and 8 Mbps Upload, speeds which are way below Florida's median download speed of 154.99 Mbps and upload speed of 21.57 Mbps based on Ookla's data.
- Affordability for many of the County's unserved and underserved citizens will remain an issue if no reliable service options are presented to them. Most of the identified rural and low-income areas are only offered DSL and cellular network connections that are unreliable to use with today's increasing bandwidth demands. Additionally, these are the highest cost services to function from.
- Digital literacy is a bottleneck to the cities around the County, especially in areas where there are high low-income population, migrant families, and rural agricultural rural

communities such as in the **City of Mascotte**, **City of Mount Dora**, **northeastern part of the County**, and many others.

- New entrants such as **Summit Broadband** (plans on deploying fiber networks) and **Open Wireless** are (plans on expanding their tower locations to rural parts) are willing to work with the County to address the connectivity service gaps specifically in unserved and rural communities.

METHODOLOGY

This comprehensive report contains different data sources gathered from the following:

- **Ookla's Speed Test Data**[6]
- **FCC's Fixed Broadband Deployment Map**[7]
- **Market Research** – BroadbandNow.com[8], Providers Service Availability Webpages, Magellan's Direct Service Offering Inquiries
- **Stakeholder Outreach** – Magellan-Organized
- **Community Survey** - Magellan-Organized

The data provided by each of the sources mentioned above are then compared through a comparative matrix to identify gaps and to address the needs and issues accordingly.

When analyzing the cost per megabit per second, Lake County residents are paying anywhere from $0.07 (Xfinity 1.2 Gig service) per megabit to $17.00 (Lumen 3Mbps) per megabit for services. In essence if someone is paying $50 for a service that provided a speed test of 50 Mbps download, that resident is paying $1 per megabit per month from a unit cost perspective. In communities where fiber-optic broadband services are available, residents are paying approximately $80 for 1 Gbps download (1,000 Mbps), they are paying **$0.08** per megabit[9]. It is clear to see that fiber-optic service offerings offer the best unit cost to customers when measuring by cost per Mbps. Further, a fiber-optic service offering is the only service capable of providing symmetrical services where download and upload speed are symmetrical, i.e., 1000 Mbps/1000 Mbps.

MARKET RESEARCH OVERVIEW

As part of this project Magellan performed a market analysis to determine the options available to residents and businesses across the county. This analysis included identifying what service offerings providers are advertising in the area, and what is available by performing a cross analysis to validate and invalidate various data sources.

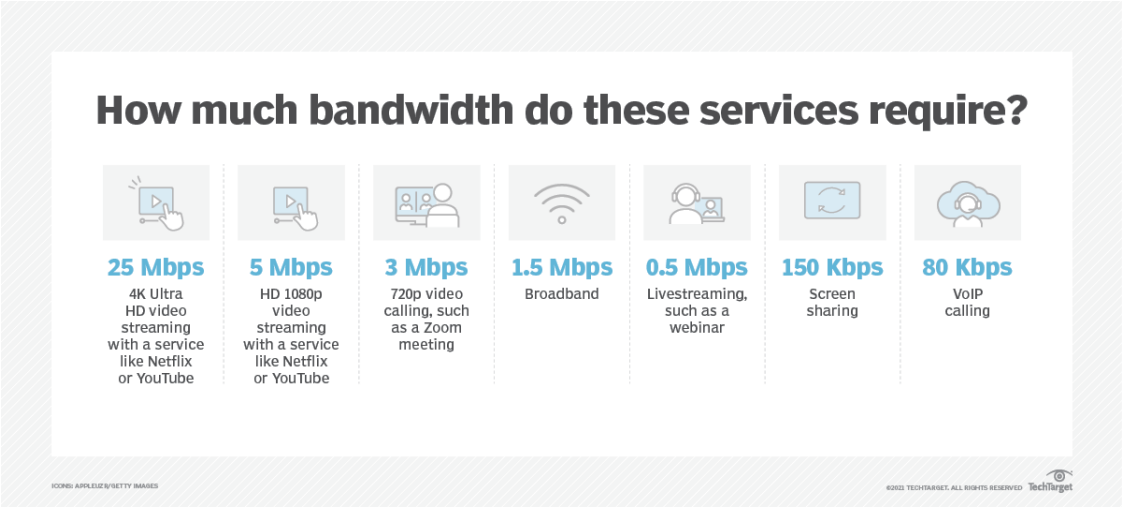
[6] https://www.speedUtest.net/global-index/united-states
[7] https://go.usa.gov/xuHQ2
[8] BroadbandNow has a comprehensive database of internet service provider information including their coverage, background and up to date service offerings per zip code - https://broadbandnow.com/
[9] https://www.cnet.com/home/internet/best-fiber-internet/

As part of this project Magellan performed a market analysis to determine the options available to residents and businesses across the county. This analysis included identifying what service offerings providers are advertising in the area, and what is available by performing a cross analysis to validate and invalidate various data sources.

ASSUMPTIONS AND DEFINITIONS

Technically, broadband refers to a communications circuit that is split into multiple, separate channels. Broadband has come to mean always on, high-speed internet access. As of January 2015, the Federal Communications Commission (FCC) defines "broadband" as a minimum of 25 megabits per second (Mbps) download speed and 3 Mbps upload speed, or "25/3." In January 2018, the FCC reaffirmed that definition, which they deemed adequate for a single user engaged in telecommuting or student activity. Most broadband services are asymmetrical, with faster download than upload, and providers commonly only advertise download speeds.

Figure 19 - Activity Bandwidth Requirement



BROADBAND ENVIRONMENT IN LAKE

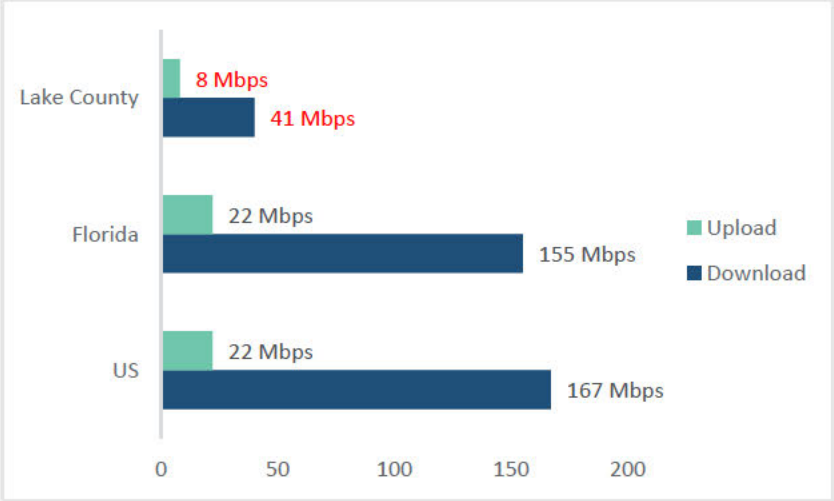
(a) Ookla Speed Test Data - U.S. Baseline Coverage[10]

OOKLA, a global leader in Internet testing, data and analysis, reports fixed, and mobile Internet speeds based on user speed tests performed using the Speedtest.net website. Reported by OOKLA, as of August 2022, the nationwide USA median fixed Internet download speed is 167.36 Mbps, and median upload speed is 22.03 Mbps. At a global level, the U.S. ranked 6th in the world for median fixed Internet speed. Florida ranked 12th in the USA, with a median download speed of 154.99 Mbps and upload speed of 21.57 Mbps. In contrast, Lake County's median speeds based

[10] https://www.speedtest.net/global-index/united-states#fixed

on the community survey performed as part of this assessment are 41 Mbps download and 8 Mbps upload speeds. The figure below shows where the County's speeds stand in relation to the rest of the country and of the state of Florida.

Figure 20 – Speeds Comparison



For mobile or cellular connections, the country's median download speed is 55.89 Mbps, and median upload speed is 7.76 Mbps. At a global level, the U.S. ranked 21st in the world for median mobile Internet speed. The top three providers for mobile Internet in the Country are T-Mobile, Verizon Wireless and AT&T. Florida ranked 25rd in the USA, with a median download speed of 55.59 Mbps and upload speed of 7.59 Mbps, having T-Mobile as the fastest provider.[411]

(b) FCC Form 477 Mapping Data[12]

The FCC's most recent fixed broadband availability map[6] as of December 2020, shown in the maps below, are based on self-reported data by the Internet Service Providers in the area. Although it is comprehensive, the FCC data has historically been ***problematic*** and ***overstated*** in many ways due to the historical reporting requirements based on service availability within a census tract. Often, even if only a few households are served in a census tract, the entire tract will be reported as ***served***. This issue has been recently identified at the FCC level, and there are initiatives underway to change the way this data is reported to reflect actual conditions more accurately.

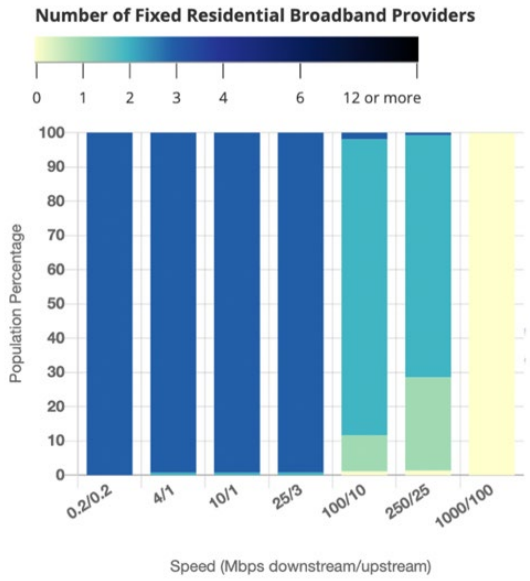
On the spectrum in Figure 21 below, the Black or the darker shading in the right most side represents 12 or more ISPs (Internet Service Providers), and as the lighter it gets to the left or to

[11] https://www.speedtest.net/global-index/united-states#mobile

[12] https://go.usa.gov/xuHQ2

Yellow, the map indicates that there is less or no providers for that class of that service available in those areas within Lake County.

Figure 21 - FCC's Number of Fixed Residential Broadband Providers



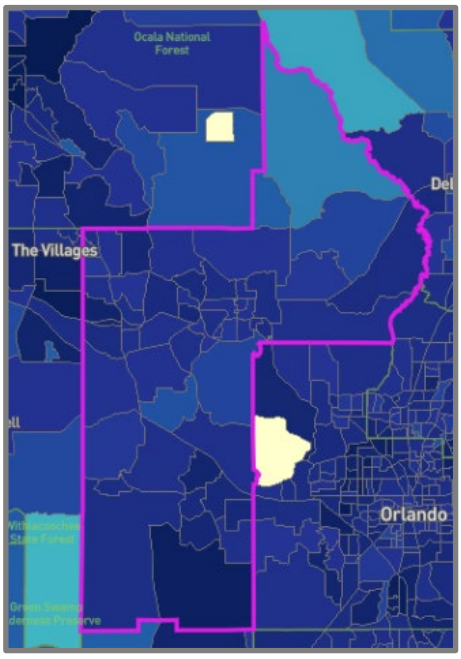


Figure 22 - Number of Providers Providing 25/3

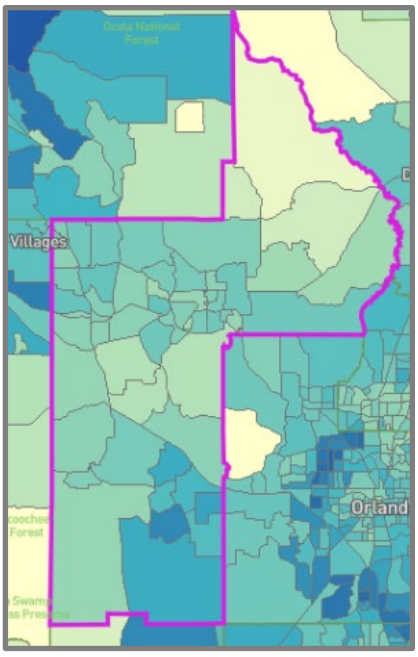


Figure 24 - Number of Providers Providing 100/10

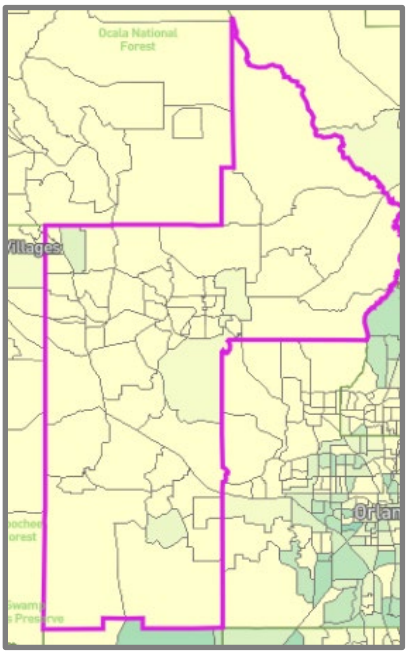


Figure 23 - Number of Providers Providing 1000/10

As shown in Figure 22 above, there are multiple ISP[13]s around the entire County that are offering 25/3 Mbps speed services. While Figure 23 shows that there are less ISP options that offer 100/10 Mbps download speeds. Finally, a Gig service or a speed of 1000/10 Mbps is scarce in the County, as the map in Figure 24 shows that 98.81% of the County has 0 providers offering this speed. Areas in the Town of Lady Lake and near the City of Mount Dora are two parts of the County where there is at least 1 provider offering this speed.

(c) Market Research

An assessment of private-sector telecommunications infrastructure and services in Lake County area provides context for a more targeted and up to date assessment. It also informs the County's strategies given the services that are available to market and not. These service offerings are then verified by Magellan by comparing multiple data sources such as what the providers report accessed through BroadbandNow[14] and each website of the major providers in the area.

Companies that nominally sell network services in Lake County are listed in Table 1.

Table 1 - Major Internet Service Providers in Lake County

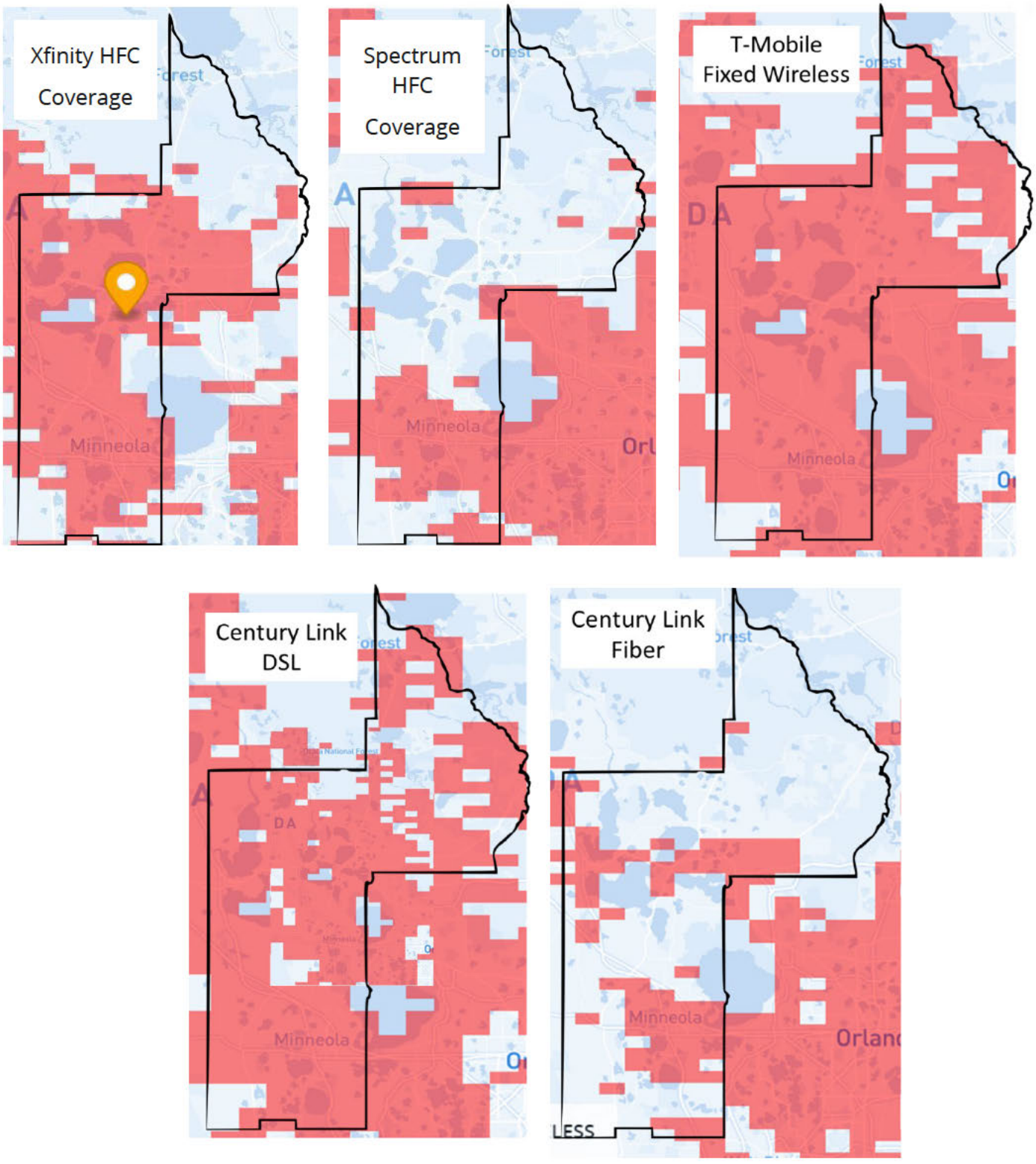
RESIDENTIAL			BUSINESS		
Provider	**% County Availability**	**Type of Connection**	**Provider**	**% County Availability**	**Type of Connection**
Xfinity	70.57%	Cable	**Comcast Business**	30.7%	Cable
CenturyLink	94.99%	DSL, Fiber	**CenturyLink Business**	85.7%	DSL, Fiber
Spectrum	33.7%	Cable	**Spectrum**	21.4%	Cable, Fiber
Summit Broadband	1.95%	Fiber	**Starlink Business**	100%	Satellite
Ultra Home Internet	81.1%	Fixed Wireless	**Ultra Home Internet**	71.4%	Fixed Wireless
Verizon	3.6%	Fixed Wireless			
Viasat Internet	100%	Satellite			
HughestNet	100%	Satellite			
Starlink	100%	Satellite			

[13] ISP - Internet Service Provider

[14] BroadbandNow - BroadbandNow has a comprehensive database of internet service provider information including their coverage, background and up to date service offerings per zip code - https://broadbandnow.com/

The following maps were created from the web resource BroadbandNow.Com[15]. They illustrate the relative coverage of each of the providers around the County in the technology they use.

Figure 25 - Major Providers' Coverage in Lake County



[15] BroadbandNow.com

To confirm each of the advertised service offerings by the providers mentioned in the table above, Magellan dove deeper through targeted research by selecting addresses within different areas of the County to inquire on the services available to them. Below are the specific addresses used:

Table 2 - Providers' Service Offerings per Residential Address

Address	Service	Spectrum	Xfinity	Lumen	Ultra Fixed Wireless
29520 NORTH BLVD, PAISLEY, FL 32767		N/A	N/A		N/A
	3 Mbps			$50.00	
40654 W 4TH AVE, UMATILLA, FL 32784		N/A			
	50 Mbps		$30.00		$144.99
	100 Mbps		$40.00	$50.00	
	300 Mbps		$55.00		
	600 Mbps		$70.00		
	900 Mbps		$75.00		
	1200 Mbps		$80.00		
36606 OSHAWA LN, EUSTIS, FL 32736		N/A	N/A		N/A
	3 Mbps			$50.00	
709 MIKE AVE, FRUITLAND PARK, FL 34731		N/A			
	10 Mbps			$50.00	
	50 Mbps		$30.00		$144.99
	100 Mbps		$40.00		
	300 Mbps		$55.00		
	600 Mbps		$70.00		
	900 Mbps		$75.00		
	1200 Mbps		$80.00		
8073 BRIDGEPORT BAY CIR, MOUNT DORA, FL 32757		N/A	N/A		
	30 Mbps			$50.00	
	50 Mbps				$144.99
27922 TAMMI DR, TAVARES, FL 32778		N/A	N/A	N/A	
	50 Mbps				$144.99
22431 LOOP RD, GROVELAND, FL 34736		N/A	N/A	N/A	N/A
15404 IVORY GULL LN, MASCOTTE, FL 34753			N/A	N/A	

	50 Mbps				$144.99
	300 Mbps	$49.99			
	500 Mbps	$69.99			
	1 Gig	$89.99			
11351 OSWALT RD, CLERMONT, FL 34711			N/A		N/A
	80 Mbps			$50.00	
	300 Mbps	$49.99			
	500 Mbps	$69.99			
	1 Gig	$89.99			
2234 MAJESTIC EAGLE CIR, CLERMONT, FL 34714			N/A	N/A	
	50 Mbps				$144.99
	300 Mbps	$49.00			
	500 Mbps	$69.99			
	1 Gig	$89.99			
6000 COOK RD, CLERMONT, FL 34714		N/A	N/A	N/A	
	50 Mbps				$144.99

In the section below are the providers' published service offerings for Lake County's residents and businesses. The prices shown below are ***Internet-only*** plans to allow more consistent comparisons. It is important to note that some of the advertised prices by these providers are often marketed at their *introductory prices*, which means after 3-24 months of service subscription the monthly rates offered are expected to increase to the standard prices.

CenturyLink now rebranded as Lumen Technologies is available to 37 states in the U.S.[16] is continuously expanding its residential fiber service they have branded as Quantum Fiber within and outside the country. CenturyLink was known for being a major DSL and fiber provider that takes advantage of fiber to the loop landline networks allowing for affordable high-speed internet. Their service coverage is known to reach rural and suburban areas of the country. CenturyLink's key benefits it offers to customers are contract-free plans and unlimited data plans. On the other hand, they still have limited fiber availability, no bundle discounts, and plans. Also, despite being available in many locations, offerings may vary in price and speeds.

[16] https://broadbandmap.fcc.gov/#/provider-detail?version=dec2020&direction=d&hoconums=130228

The community survey performed by Magellan for this assessment shows that 89% of the respondents subscribed to Lumen only have DSL services. Upon verifying these addresses, it is confirmed that Fiber services is not an option for their locations.

Table 3 - Lumen's Residential Monthly Subscription Rate per Download Speed in Mbps[17]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
CenturyLink Simply Unlimited Internet	DSL	100 Mbps	$50	$0.50	Unlimited Data, No Annual Contract
Quantum Fiber Up to 940 Mbps	Fiber	200 Mbps	$30	$0.15	Unlimited Data, No Annual Contract
Quantum Fiber Up to 940 Mbps	Fiber	940 Mbps	$65	$0.07	Unlimited Data, No Annual Contract

Table 4 – Lumen's Small Business Monthly Subscription Rate per Download Speed in Mbps[18]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Simply Unlimited Business	DSL	100 Mbps	$50	$0.50	Unlimited Data, No Annual Contract
Business Fiber	Fiber	940 Mbps	$70	$0.07	Unlimited Data, No Annual Contract

Xfinity, Comcast's retail broadband service offering is well-known for its numerous bundling packages with voice, television, streaming and home security services. Xfinity has been the largest cable provider in the country and specifically offers a hybrid-coaxial cable internet to its customers across 41 states. In Florida, Xfinity provided free public Wi-Fi across the state to assist its citizens recovery from the recent storm Ian and helped ensure that communication was possible to reach family or in cases of emergencies.

Based in the community survey, 15% respondents are currently subscribed to the cable internet services of Xfinity/Comcast Business. The survey also shows that the average speeds of their subscribers in the County are 212 Mbps download and 19 Mbps upload speeds. However, upon looking at the expected speeds that they have paid for, it indicates that their achieved speeds are well below what they are paying for.

[17] https://internet.centurylink.com/lp/
[18] https://www.centurylink.com/small-business/business-internet/

Table 5 - Xfinity's Residential Monthly Subscription Rate per Download Speed in Mbps[19]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Connect	Cable	50 Mbps	$59.00	$1.18	1-year term contract
Connect More	Cable	100 Mbps	$79.00	$0.79	1-year term contract
Fast	Cable	300 Mbps	$89.00	$0.30	No term contract
Superfast	Cable	600 Mbps	$99.00	$0.17	No term contract
Ultrafast	Cable	900 Mbps	$109.00	$0.12	No term contract
Gigabit Extra	Cable	1,200 Mbps	$119.00	$0.10	No term contract

Table 6 - Comcast Business Monthly Subscription Rate per Download Speed in Mbps[20]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Essential	Cable	50 Mbps	$70.00	$1.40	Introductory price for 24 months then will charge regular rates; 2-year contract
Standard	Cable	100 Mbps	$70.00	$0.70	Introductory price for 12 months then will charge regular rates
Performance	Cable	250 Mbps	$110.00	$0.44	Introductory price for 24 months then will charge regular rates; 2-year contract
Advanced	Cable	500 Mbps	$140.00	$0.28	Introductory price for 24 months then will charge regular rates; 2-year contract
Gigabit Extra	Cable	1200 Mbps	$210.00	$0.18	Introductory price for 24 months then will charge regular rates; 2-year contract

Spectrum is an Internet service segment offered by its parent company, Charter Communications. What sets Spectrum apart from other cable providers are its features including contract-free plans, unlimited data on all plans and no equipment rental fee. However, the caveat to their services is the varying speed throughout the day depending on the number of users connected to the network and the varying plan offerings per location. In short, though it is available and affordable to most customers in Lake County, its service reliability may be an area of major concern. The standard service offerings are shown in the table below.

[19] https://www.Xfinity.com/digital/offers/plan-builder
[20] https://business.comcast.com/shop/offers/?servicesl

The community survey shows that the average speeds of their subscribers in the County are 179 Mbps download and 14 Mbps upload speeds.

Table 7 - Spectrum's Published Residential Internet Service Offerings in Lake County[21]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Spectrum Internet	Cable	300 Mbps	$49.99	$0.17	Unlimited Data, plus WI-FI fee
Internet Ultra	Cable	500 Mbps	$69.99	$0.14	Unlimited Data, plus WI-FI fee
Internet Gig	Cable	1 Gbps	$89.99	$0.09	Unlimited Data, plus WI-FI fee

Table 8 - Spectrum's Published Business Internet Service Offerings in Lake County[22]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Spectrum Internet	Cable	300 Mbps	$49.99	$0.17	Unlimited Data , plus WI-FI fee
Internet Ultra	Cable	600 Mbps	$99.99	$0.17	Unlimited Data, plus WI-FI fee
Internet Gig	Cable	1 Gbps	$164.99	$0.16	Unlimited Data, no WI-FI fee

T-Mobile provides 5G and 4G LTE fixed wireless service in households in 50 states in the US. Its home plan main features are contract-free and unlimited data access. The typical download speeds it offers is between 33-182 Mbps and may vary according to location, time of the day, weather, and other factors[23].

[21] https://www.spectrum.com/internet-service/florida/Lake-county

[22] https://www.spectrum.com/business/internet

[23] https://broadbandnow.com/t-mobile-home-internet-deals

Table 9 - AT&T's Residential Monthly Subscription Rate per Download Speed in Mbps[24]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
5G Home Internet	Fixed Wireless	30-182 Mbps	$50.00	$0.27	Unlimited Data, No Annual Contract

Viasat, formerly known as Exede is a major satellite communications provider operating in Lake County. Though satellite services are not the first internet option for many, it provides accessible connectivity in many rural areas. Their plans, as shown in Table 12 below, offer unlimited internet or no data caps unlike many other internet providers, but the speed may slow down after using 40-150 GB of data depending on the plan chosen. All plans are expected to increase their monthly rates after three months of subscription.

Table 10 - Viasat's Published Residential Internet Service Offerings in Lake County[25]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Unlimited Bronze 12	Satellite	12 Mbps	$69.99	$5.83	40 GB High Speed-Data
Unlimited Silver 25	Satellite	25 Mbps	$99.99	$4.00	60 GB High Speed-Data
Unlimited Gold 50	Satellite	50 Mbps	$149.99	$3.00	100 GB High Speed-Data
Unlimited Platinum 100	Satellite	100 Mbps	$199.99	$0.20	150 GB High Speed-Data

HughesNet offers similar plans as Viasat in Lake County market, but with lower speeds and includes data caps. All HughesNet plans are 25 Mbps download speed with different data caps. The plans range from 15 GB data cap for $64.99 after promo discount to 75 GB data cap for $159.99 per month. Prices for each of the plans are all for 2-year contracts. All plans are initially offered in introductory rates and are expected to increase their monthly rates after six months of subscription. The table below shows the standard rates after the 6-month period. Typically, new satellite customers are burdened with the installation costs however, HughesNet offers a leasing option of their equipment.

[24] https://www.t-mobile.com/isp
[25] https://buy.viasat.com/en-US/r/pln

Table 11 - HughesNet's Residential Monthly Subscription Rate per Download Speed in Mbps[26]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
15GB	Satellite	25 Mbps	$64.99	$2.60	15 GB High Speed-Data; 24-month commitment required
30GB	Satellite	25 Mbps	$74.99	$3.00	30 GB High Speed-Data; 24-month commitment required
45GB	Satellite	25 Mbps	$109.99	$4.40	45 GB High Speed-Data; 24-month commitment required
75GB	Satellite	25 Mbps	$159.99	$6.40	75 GB High Speed-Data; 24-month commitment required

STARLINK

Starlink is a satellite constellation system that aims to deliver global internet coverage. This system is ideally suited for rural and geographically isolated areas where internet connectivity is unreliable or nonexistent.

Table 12 - Starlink's Published Residential Internet Service Offerings in Lake County[27]

Package	Type of Connection	Download Speed	MRC	MRC per Mbps	Notes
Residential	Satellite	50-200 Mbps	$110.00	$2.60	$599 equipment cost
Business	Satellite	50-200 Mbps	$500.00	$3.00	$2500 Equipment Cost
RV/Mobile	Satellite	50-200 Mbps	$135.00	$4.40	$599 equipment cost

STAKEHOLDER OUTREACH OVERVIEW

Fast, economical, reliable internet access is essential for participation in today's digital economy. Lake County's Broadband Study aimed to understand the true connectivity gaps and needs across Lake's communities that limit the ability of businesses and residents in the region to thrive. Magellan engaged stakeholder representatives from eleven different entities

[26] https://internet.hughesnet.com/order-online/product-selection/
[27] https://broadbandnow.com/starlink

and discussed their connectivity needs and issues. We sought out representatives of stakeholders in government, education, healthcare, economic development, small business, and other influential sectors in the County (refer to Appendix 2 for the complete list with names and roles of the stakeholder that were interviewed). Each of the discussions was led by Magellan with an agenda that started with an introduction to Lake County's broadband project, information on the standard baseline residential connectivity speeds as defined by the FCC[28], and questions regarding Lake County residents' connectivity as it relates to Internet accessibility, reliability, and affordability.

The stakeholders that Magellan has engaged with, represent a wide cross section of Lake County. The section below summarizes the discussions Magellan had with the key stakeholders.

(a) County Leaders

i. Economic Development

The County's Economic Development representatives defined the County to have a generally low-income and older population. Because of this demographical characteristic, the County has relatively slow economic development growth compared to its neighboring counties. Some areas within the County, such as Clermont, are generally ahead in terms of economic growth due to its proximity to the populous and urbanized area of Orange County. Some areas within the County identified by the Economic Development team that have needs for growth, are cities that belong to the *Triangle Community.* This includes the City of Mount Dora, Town of Astatula, City of Eustis, Town of Howey-in-the-Hills, Community of Sorento, Community of Mount Plymouth, City of Tavares and Community of Yalaha. These cities are made up of small manufacturing and agricultural communities. They all are in need of infrastructure investments to catch up with the broadband bandwidth demands of today's technologies in order to incorporate automation into their day-to-day systems and operations. Accessibility and reliability are of equal concern within these communities.

In conclusion, more rural areas will have limited growth and may worsen the economic gap in the County. This may be avoided if timely action is taken by developing plans to create a future-proof broadband infrastructure for all the County citizens. In addition, the County must pay attention to the quality of connectivity in and around the areas that have rapidly increasing bandwidth demands.

ii. County Departments

The County's Library Services department offer both computers and a public Wi-Fi network to residents. The County operates 16 library locations within Lake County with 15 of them being connected to the internet through Summit Broadband's fiber network and one of which is located in Astor and is connected through a wireless network. This location in Astor is said to always have

[28] Federal Communications Commission – an independent government agency that regulates communications by radio, television, wire, satellite, and cable across the United States.

broadband connectivity issues such as frequent outages and slowdowns in speed. The Library mentioned that there are also pockets of communities in the southern part of the County that need better connectivity.

The Sheriff's Office emphasized their need for a better cellular connectivity solution which is critical to their mobile operations. They are currently subscribed to Verizon's cellular network. As for their physical sites, only the Sherriff's main office and jail are connected through fiber. All other Sheriff sites subscribe to business class Internet provided over HFC by Comcast.

The Public Works department is currently working on a middle-mile backbone project with a goal to make the County's operations more cost and time efficient, by being able to control and monitor traffic signals in real time. Their demand for bandwidth is expected to increase.

The Transportation department plans on providing access to the public by putting free public Wi-Fi in their buses.

The Veterans Services department emphasized that they are mostly dealing with digital literacy issues among their patrons amongst their customer base which means their ability to connect to these users through online services and apps are limited.

The Housing and Community Services department mentioned that it would be ideal for the County to make outdoor broadband access available for those residents who are not able to afford broadband, and also for those who are not comfortable going indoors for internet access such as inside the public libraries, for any personal reasons. The County could focus on deploying Wi-Fi in outdoor parks and other public spaces.

According to the Planning and Zoning department, there are redevelopments including new infrastructure underway around the areas of Mt. Plymouth-Sorrento by the CRA (Community Redevelopment Agency). These redeveloped areas will have a great need for bandwidth in the near future and may be a good opportunity to apply the *dig-once policy* together with any broadband infrastructure projects to make planning and construction more time and cost effective for the County.

The Housing department and some of the libraries are already sharing the ACP (Affordability Connectivity Program) information with their eligible patrons around the County.

(b) Cities/Towns

The Town of Howey-in-the-Hills is surrounded by rural areas, and people from these areas who have internet accessibility issues use their libraries' connectivity for doing schoolwork, researching, job hunting/applications, and other critical tasks.

City of Tavares' main issue is their last mile access, as providers have no interest in extending their services to many of its areas that do not seem profitable. Many of the city's citizens end up using the public spaces' broadband connection such as Wi-Fi in their libraries and parks.

The Town of Lady Lake's main issue is the lack of affordable options for its citizens. The town's current goal is to improve their town's municipal network connectivity by building out their own

fiber backbone, and to potentially leverage these assets to provide better services to town residents. The town is currently working on this by creating a phased 5-year Master Plan.

Similarly, the City of Mount Dora is lacking in competitively affordable options. Their major providers are Xfinity/Comcast and Lumen/CenturyLink, and neither provide a fiber-to-the-home option. They have surveyed 850 multi-generational homes within the city and have identified that the majority of them are unserved. In addition, the students in their city who cannot afford a device, nor a broadband connection were provided a laptop and a hotspot device but are all experiencing very slow speeds due to an overwhelmed network. Mount Dora also shared that there are two major initiatives that the city is working on which will involve an increase in bandwidth demands. One is on the development of their *Innovation District* which will have plenty of businesses and some multi-family homes. Another project they are prioritizing is improving the safety and overall communication access in the Trail Extension they are building. The city's main provider is Lumen, and they contract with Lumen to provide a public Wi-Fi in the city's downtown. Currently, the frustrations of the city's stakeholders are rooted in the unreliable 5G services they are receiving from Verizon and AT&T. They have expressed that many of their critical mobile operations related to safety and emergency within the city are dependent on what these two providers can offer.

The Town of Astatula is also combating issues tied to the lack of broadband service options. Currently, only Lumen/CenturyLink's DSL is widely available in the town. With that, they are utilizing a $3.8 million State of Florida grant to implement a fiber network and to enhance their cellular networks. Their goal is to attract more service providers to build out and improve services, offering overall better-quality services with more competitive pricing.

The City of Mascotte has a lot of rural agricultural and migrant communities that are unserved. Also appears that the T-Mobile cellular coverage is inconsistent in this area. Spectrum does not cover Mascotte.

The Town of Leesburg had its own fiber utility providing service to government agencies which include Lake County schools. This utility has been sold to Summit Broadband. They have not received any updates as to whether Summit Broadband will extend this network to offer Fiber-to-the Home services to its residents. The rural and underserved area identified by Leesburg's representative is at the edge of the City of Mount Dora on the east side of highway 44's exit from the City of Eustis.

The City of Groveland similarly has both affordability and accessibility issues. Their options in the area are mainly Spectrum and Xfinity/Comcast. Majority have access to at least one of those major service providers, however if they access Spectrum most of the residents only have access to their minimum speed service, while Comcast generally offers more costly service options. Many of the city's citizens also rely heavily on satellite services, but these services are not always reliable and are not affordable to many. Therefore, the ultimate goal of the city is to be able to provide more reliable and cost effective options for their citizens.

The City of Clermont seems to be mostly well-served based on the interview with their city representative. It is not a surprise that more providers are offering their services with competitive pricings and deals in this more populated area closest to Orange County. The City does own and operate its own fiber backbone, and reports there is only one fire station not currently connected.

The City of Eustis is described to be very similar to Clermont which is well served and has a good amount of provider service options within the city core. The city will not be allocating any of its ARPA funds for broadband.

(c) Education

i. Lake County School Board

The Lake County Schools is responsible for over 43,000 students, and equity of resources was an issue brought up by school board representatives. Lake County Schools have improved their Wi-Fi connections in order to support the use of Chromebooks that were distributed to their students during the pandemic. The pandemic pushed the schools to create several digital platforms to communicate better with the students and their parents. These platforms such as *Lake Live* are planned to be continuously used, especially now that they have seen flexibility and other advantages that a hybrid learning environment could offer their students, even in the post-pandemic time. In addition, the teachers are expected to use more digital tools to enable collaborations and access to more online educational pieces. This will increase the demand for fast and reliable broadband connections in the home.

ii. Lake Technical College

Their building is located in a Lake County School building and is connected to the internet through the County's fiber network. They mentioned that many of their students need to be on campus for their face-to-face technical classes and hands on activities. A number of new students were accommodated in the campus last August 15, increasing their need for bandwidth in their location. The only issue that they are facing right now is the filtering of data that happens within the County network. This limits their connection.

(d) Local Businesses

Representatives from several businesses such as the ones in the healthcare industry and the Tavares Chamber of Commerce were interviewed for this assessment. The stakeholders brought up a common theme which is affordability, especially for their customers from the rural parts of the County. For instance, the healthcare businesses are concerned that their patients who need remote monitoring can neither afford nor have access to a reliable broadband connection. One stakeholder shared that the reliable services available to their customers are Verizon and AT&T cellular, but both are pocketed in certain areas only.

(e) Internet Service Providers

i. Lucien Wireless

Magellan interviewed the founder of Lucien Wireless and he emphasized that they are involved in the community and operate by collaborating with them. One of their initiatives is a youth development program for IT and Network Infrastructure-Engineering. Their team has also conducted a feasibility study in Howey-in-the-Hills and would be interested in learning more about the rural areas in the County that are particularly unserved and underserved.

ii. Comcast/Xfinity

Comcast shares that they see some connectivity needs in the rural areas of the Northeast of the County. The County has provided them an active list of addresses that are currently unserved and underserved in order for them to review and determine what they can do to contribute to possible projects as an outcome of this assessment. They asked the County in return to support them by speeding up processes such as permitting and coordinating on pole attachments when proposed project areas are identified.

iii. Open Wireless

Open Wireless serves the City of Groveland. Their tower is located on Highway 50 with an 8 to 10-mile radius coverage. They are currently offering 15 Mbps download and 5 Mbps upload speeds and plan to increase this to a 25 or 50 Mbps service. Reliability of their network is their strength based on their customers' feedbacks, and they are also being requested to offer bundle services. They are working with Crosspoint Internet to serve as many communities as they could. However, they have challenges determining areas to prioritize due to the 477 data's lack of accuracy. Their team also shared that the County could best support them through opening up grant opportunities to fund their service expansions once priority areas are defined.

iv. Crosspoint Internet

Crosspoint overlaps with some of Open Wireless' areas and are mainly serving the Northwest or the north of Open Wireless' service area. Similarly, they are interested in looking into more accurate data on the unserved and underserved areas and learning more about any grant opportunities.

v. Summit Broadband

Summit Broadband shares that they have been building out fiber networks across the County, with Leesburg having the highest count for their fiber backbone network. They plan to continue building fiber out in areas that the County points out to be unserved. Based on their data, there is a lot of network traffic in south Lake County, more specifically in the City of Clermont area. They also mentioned having a data center located on Sorrento Road down in the City of Apopka which is in close proximity to these high-traffic areas.

The areas of concern they have identified are Town of Astatula and Town of Howey-in-the-Hills. They are currently deploying a fiber backbone network in the Town of Astatula. Summit also

expressed their interest in partnering with the County's LTPT team to ensure an efficient deployment of the BOR's (Bureau of Reclamation) WaterSMART grant in the County as it relates to connectivity.

vi. Lumen Technology

Lumen Technology has planned technological deployments such as GPON networks across the County which should enable them to provide 940/940 Mbps symmetrical speeds and has scalability for up to 8/8 Gbps. Like the other providers, their main challenge in deployment is the accuracy of the mapping data available to them in order to identify the areas in need.

(f) Utility Providers

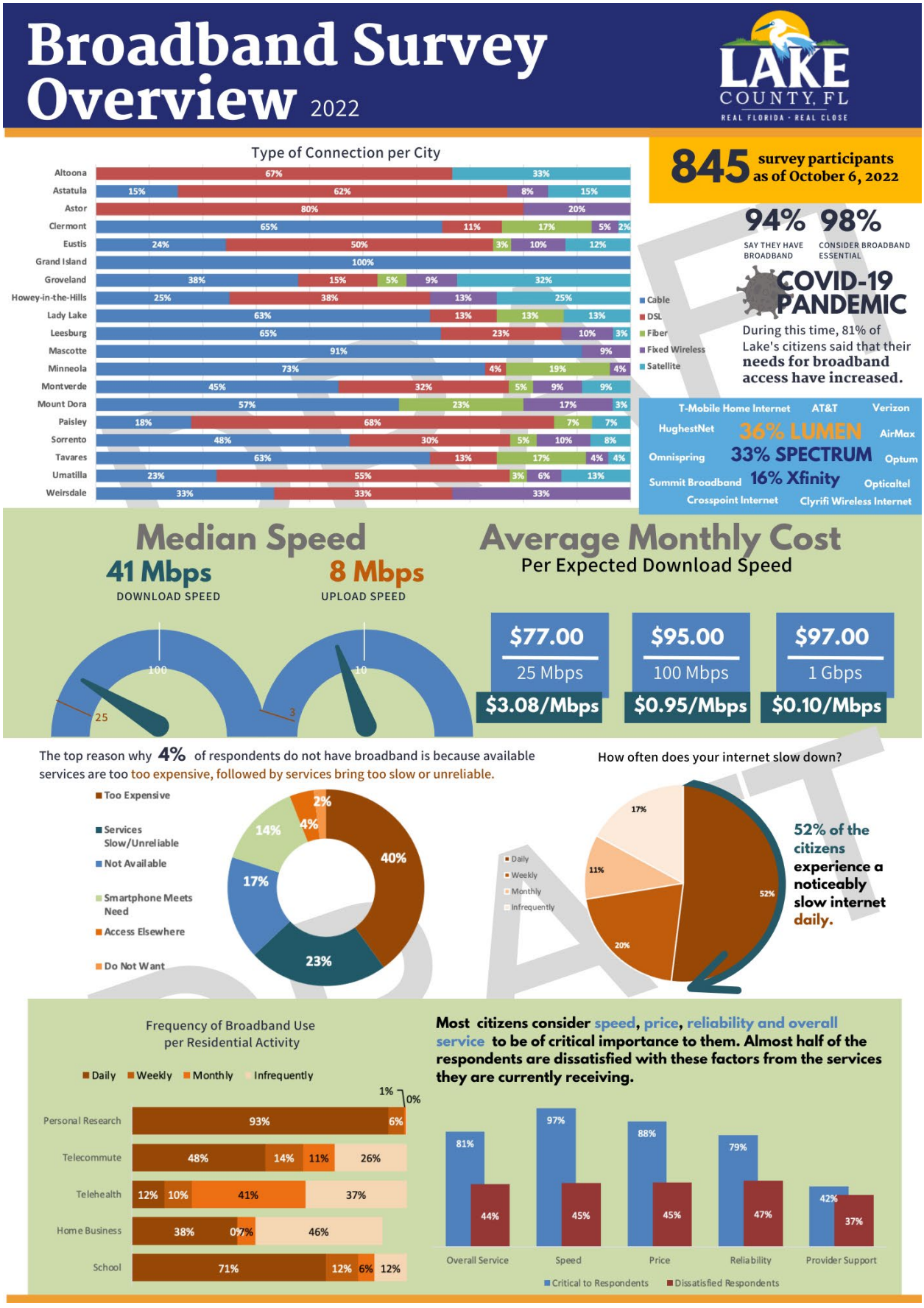
i. SECO Energy

Lake County's electric utility SECO has seen a tremendous economic growth in the County. They have seen this through the number of large developments that they provide power. This growth trend is projected to continue and with that, they expect numerous construction projects in the near future. They see this as an opportunity to do joint trenching with cable companies to take advantage of the upcoming underground construction especially for the residential developments.

SURVEY SUMMARY AND DETAILS

Magellan created a broadband survey for residents and businesses in Lake County. The County's project team dispersed paper surveys and online surveys through a variety of means (i.e., social media, chamber events, County website, Lake County Schools' Skyward communication platform). The survey resulted in 845 responses as of October 6 (excluding paper surveys for which are still being collected). The distribution of the survey responses was 98% residents and 2% businesses. The main goal of this survey was to determine broadband availability, pricing, and service satisfaction among the citizens and businesses in Lake County.

Figure 26 - Lake County Broadband Survey Infographic



Future Demand

Broadband is a high-capacity transmission technique using a wide range of frequencies, which enables many messages to be communicated simultaneously. There is no one technology that can accomplish this task in a complete, affordable way. It is accomplished today by combinations of technologies working together, including copper, fiber optics, wireless, and satellite.

The Federal Communications Commission (FCC) defines broadband as high-speed internet that reliably delivers speeds of at least 25 Mbps download and 3 Mbps upload. However, as the shift to virtual work, online learning, and telehealth during the COVID-19 pandemic demonstrated, the number of users, devices, and type of internet usage will ultimately define the broadband needs of each household.

The more users and the types of activities the internet is used for will increase the demand for higher bandwidth speeds. For example, if two people are working from home and need to connect to online conference calls in combination with children doing distance learning and streaming videos for classes, the bandwidth needs would greatly surpass the Federal 25/3 Mbps definition and could easily require at least 100-200 Mbps. The table below displays average data usage for common activities.

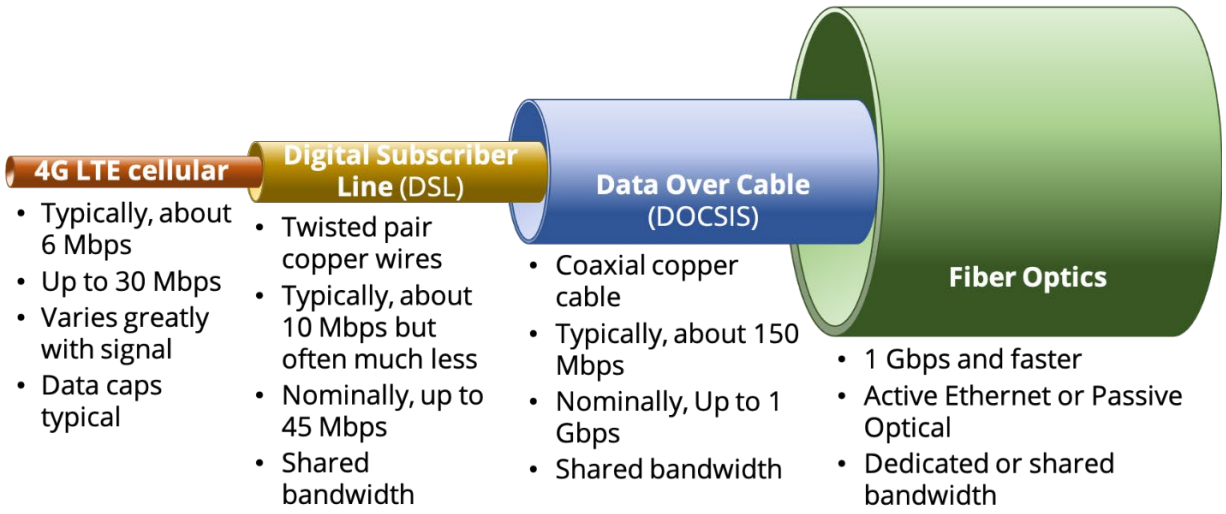
Figure 27 - Data Usage by Application

Internet activity	*Average*
Email	20KB
Email (with attachment)	300KB
Downloading a song	4MB
Browsing the web	15MB per hour
Instagram	100MB per hour
Facebook	156MB per hour
Twitter	360MB per hour
Streaming standard-definition (SD) video	700MB per hour
Streaming high-definition (HD) video	2.5GB per hour
Streaming ultra-HD (4K) video	5.8GB per hour
Streaming music	72MB per hour
Online gaming	80MB per hour

There are only a few ways to build networks capable of supporting these speeds. As shown in the figure below, fiber-optics is the only network technology that can support the ultra-high broadband demands being placed on networks in the digital age. Fiber-optics uses pulsating light to transmit data through flexible glass "tubes." This enables the transmission of massive amounts

of data moving at the speed of light. Fiber uses technology that allows for symmetrical speeds, equal upload, and download, allowing for sufficient bandwidth to support users to both send and receive large amounts of data needed for applications such as video conferencing.

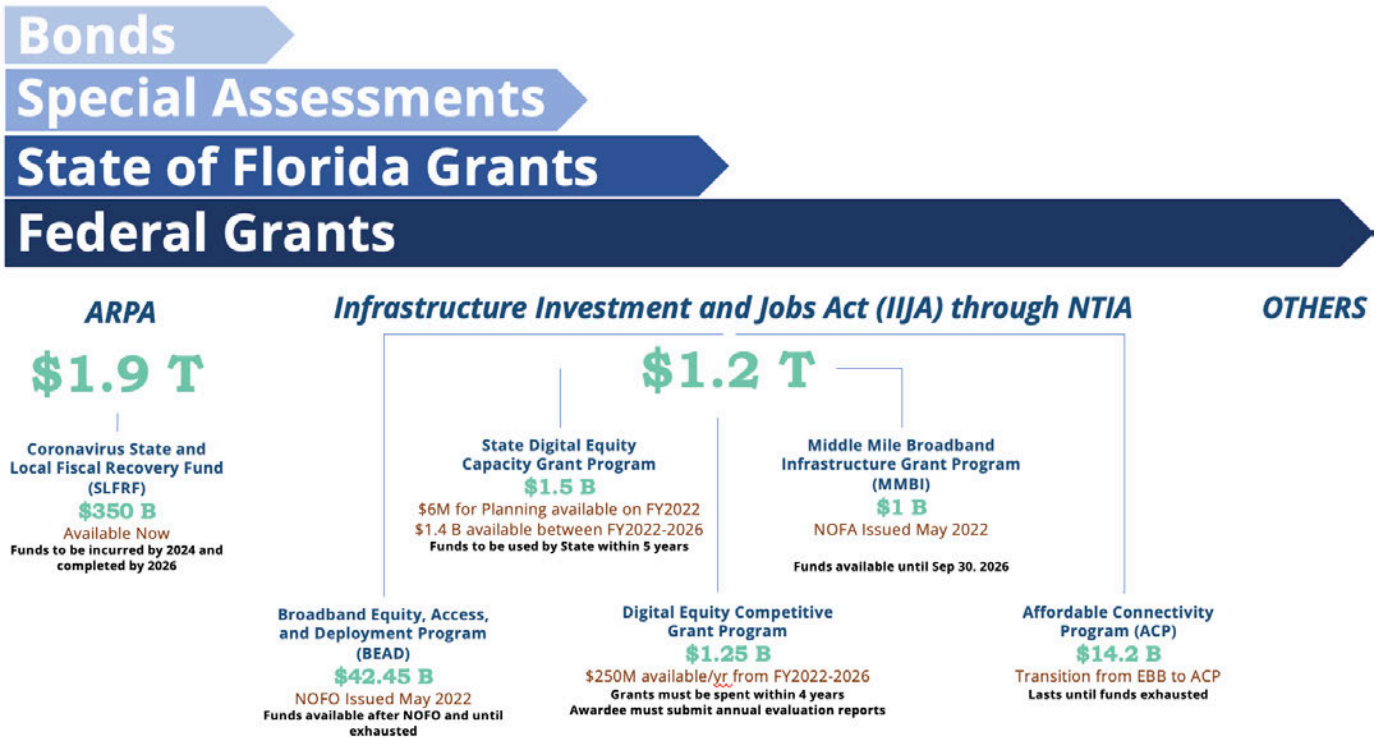
Figure 28 - Speed Associated with Internet Technologies



While the overwhelming infrastructure across Lake County in the last-mile is copper based networks consisting of DOCSIS and legacy DSL services provided by Spectrum and CenturyLink respectively, providers generally have begun to indicate fiber is the preferred long-term choice and have released hints that some will begin to overbuild their copper systems, pivoting from deploying fiber in only new greenfield developments. There are also fiber overbuilders that have shown interest in expanding to Lake County and will deploy fiber last-mile services to increase competition in the market.

The rush is on in the United States to deliver fiber in the last-mile to every premise across the country – it is likely Lake will see legacy copper networks being replaced and phased out as fiber deployments are seen being deployed more favorably going forward. This rush is being driven largely by an unprecedented amount of federal funding that has been made available through various pieces of federal legislation as outlined below. Bonds, special assessments, and grants being provided by the Florida Office of Broadband's Opportunity Program are other key funding sources being utilized across Florida at this moment.

Figure 29 - Florida Funding Options for Broadband and Grant Summary



The Broadband Opportunity Program is contained in the Florida Broadband Deployment Act of 2021 (HB 1239), which passed unanimously in both the House and Senate and became effective July 1, 2021. The Broadband Opportunity Fund grant funding is provided for infrastructure deployments to expand service to unserved areas. Unserved areas are defined in the Act based on the current FCC definition of broadband – lacking access to service with 25 Mbps download and 3 Mbps upload transmission speeds.

The Broadband Opportunity Program grants are subject to appropriations, and the condition that the funds "may not be used to install or deploy broadband Internet service to a geographic area in which broadband Internet service is already deployed by at least one provider."[5] In practice, these latter provisions are subject to interpretation and increase the likelihood that grants will be challenged by incumbent providers.

Further conditions preclude grants from being awarded:

- To a "governmental entity or an educational institution or affiliate to provide broadband Internet service to any residential or commercial premises, unless other broadband Internet service providers have not deployed service to an unserved area."[6]
- For a "project area for which any other federal funding has been awarded". [7]

[5] F.S. 288.9962 (2).
[6] F.S. 288.9962 (4).
[7] F.S. 288.9962 (8)(a).

- Which fund greater than 50% of the total cost of a project.[27]
- In amounts in excess of $5 million.[28]

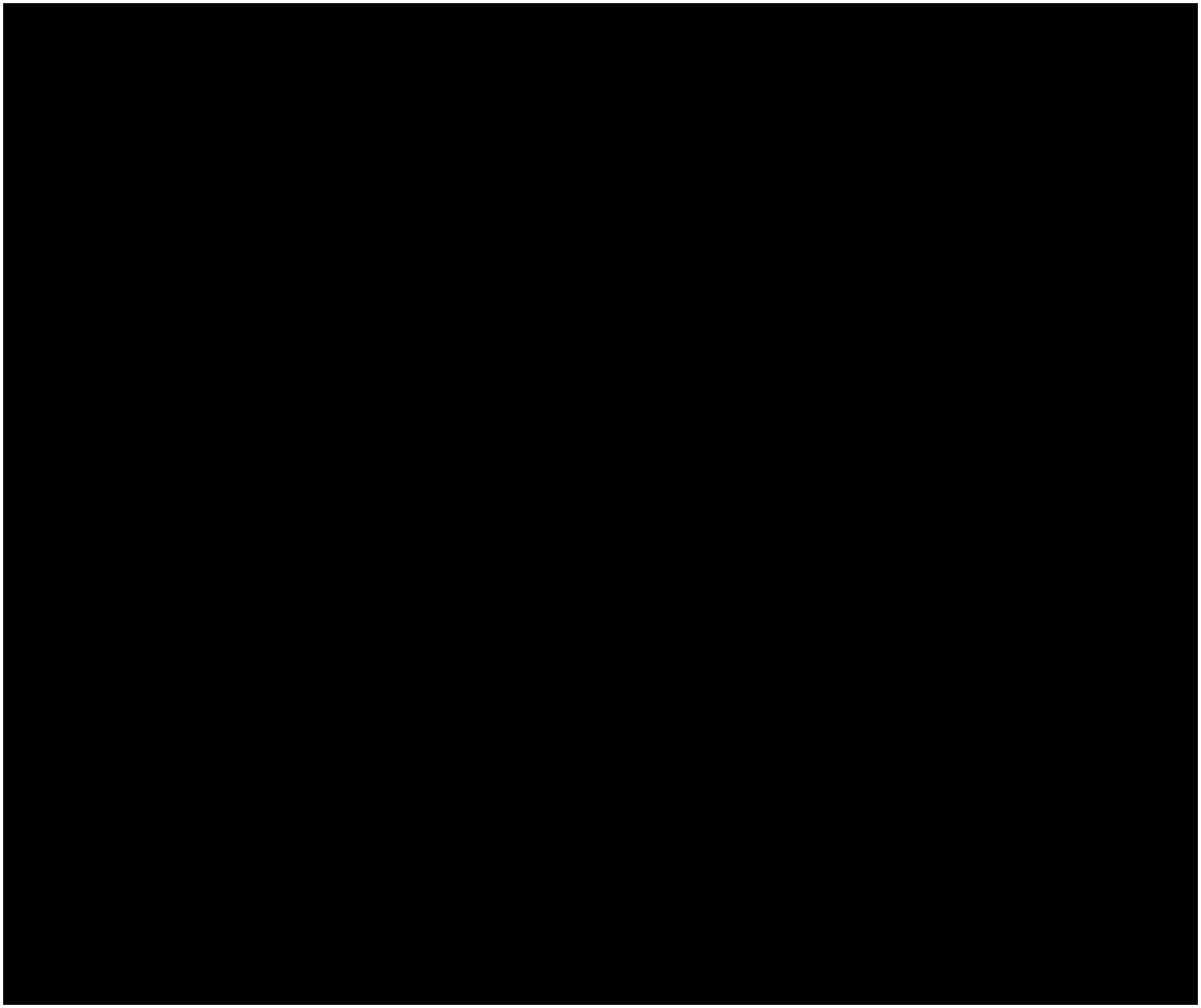
Those eligible to apply for grants include corporations, limited liability companies and partnerships, political subdivisions, and Indian tribes. Further statutory requirements and provisions of the Broadband Opportunity Program include:

- Prescribing the information which must be included in a grant application, including provision of evidence that the project area is unserved.
- Publication of the specific criteria and scoring system that will be used to evaluate or rank grant applications.
- Publication of grant applications and the areas proposed to be served before the application's closing on December 2, 2022, and a 45-day window for any provider to challenge the grant application by indicating it serves the area or commits to serve the area.
- Criteria for prioritizing applications including those which offer broadband to important community anchor institutions, facilitate telemedicine and electronic health records, serve economically distressed areas of the state, provide scalability of speeds, promote adoption in the community, provide strong evidence of community support, provide access to the greatest number of unserved premises, leverage greater amounts of funding from private sources, and are consistent with the Strategic Plan.

Of course, the most widely referenced federal funding source for broadband at present is through the Infrastructure Investment and Jobs Act including the several programs administered by the NTIA for middle mile and access deployments, digital equity, and the Affordable Connectivity Program. However, there are numerous other federal funding sources through the FCC (i.e., E-rate for schools and libraries, and the Rural Digital Opportunity Fund or RDOF), Rural Utilities Service (RUS, or the former REA, including the ReConnect program), and through Housing and Urban Development (including the HOME Investment Partnerships Program, CDBG program, and the Housing Trust Fund) which may be considered.

[27] F.S. 288.9962 (8)(c).
[28] F.S. 288.9962 (8)(d).

Appendix 1: Tower Sites List



Appendix 2: Stakeholders List

Organization Groups/Industry	Title	Name
Economic Development	Director of Future-Ready City at City of Orlando	Michael Hess
	Economic Development Director	Luis Nieves-Ruiz
BCC and Sheriff	Director of Information Technology	Erikk Ross
	Economic Growth - Associate Director	Mary Ellen Stern
	Engineering - Manager	Jeff Earhart
	Public Safety - Director	Gregory Holcomb
	Transit Services - Director	Jill Brown
	Library Services - Director	George Taylor
	Veterans Services - Public Safety Officer	Kirk Armstrong
	Planning - Senior Planner/Director	Bobby Howell
	Traffic Engineering	George Gadiel
	Sheriff IT Director	Corey Pendergraft
	Sheriff Network Administrator	Scott Lenninger
	Sheriff Computer Technician	Ian O'Keefe
	Assistant Traffic Operations Supervisor	James Globig
	Director of Communications	Levar Cooper
	Director of Housing and Community Services	Maria AbdoulKarim
	Civil Engineer	Sharon Lewis
Cities	Vice Mayor at Astatula	Steve Cross
	IT Director at Clermont	Wayne Fountain
	Deputy Planning Director at Mount Dora	Adam Sumner
	Director of IT at Mount Dora	Jim Faulkner

	City Manager at Howey-in-the-Hills	Sean O'Keefe
	IT Director at Lady Lake	John Pearl
	IT Manager at Tavares	Alex Patton
	Director of IT at Groveland	Jose Lopez
	City Manager at Eustis	Tom Carrino
	IT Manager at Eustis	Greg Barron
	City Manager at Mascotte	Anna Marie Reno
	Network NGIS City Manager at Leesburg	Mike Andrews
Schools	Executive Director at Lake Technical College	DeAnna D. Thomas
	Chief Technology Officer at Lake County School Board	Duane Weeks
Internet Service Providers	Founder at Lucian Wireless	Sheldon Lucien
	Senior Director of External Affairs at Comcast Florida	Bill Ferry
	Owner at Open Wireless	Alex Robinson
	Owner at Crosspoint Internet	Mitchell Stiefel
	Director of Government Relations and Partnerships at Summit Broadband	Mark Ogles
	Solutions Architect at Summit Broadband	Stephen McPherson
	Representative at Summit Broadband	Larry Spear
	Director of Facilities Management at Lumen Technology	Todd Tobias
Utility Providers/SECO	Deputy General Counsel	Tracy de Lemos Esq.
	Manager of Geospatial Services	Barry Owens
Local Businesses	Director of IT - Cornerstone Hospice and Palliative Care Inc	Robert Burgett

	CEO - Tavares Chamber of Commerce	Erika Buigas
	Leesburg Partnership	Joanie Smalley
	IS Director of Waterman Hospital	Kurt Barno

Appendix 3: Business Models Overview

The general requirements throughout Lake County, particularly for business and industry, are for much greater throughput: network access should be symmetrical 1 Gbps services with a path to 10 Gbps services. Private industry and public institutions require multiple providers and redundant network routes in the area for greater reliability. The general requirements in more rural parts of the County are more fundamental: Simple access.

Services based on coaxial cables and twisted pair wires simply can't economically meet these requirements. Indeed, these general requirements translate into more specific infrastructure requirements. Lake County needs to focus on expanded fiber backhaul and towers where they lack, as well as key last-mile distribution technologies to provide retail Internet services.

BROADBAND TECHNOLOGY FOR LAKE COUNTY

The right choice for broadband technology is imperative for Lake County's deployment of infrastructure in areas of the County.

Fiber-optic technology is the gold standard, it maintains life for 20+ years and is the infrastructure that enables all other technologies including advances in wireless, satellite, and 5G. In order to develop a long-term broadband infrastructure plan, the County must make investment in fiber optic projects where it can.

BROADBAND BUSINESS MODEL OPTIONS

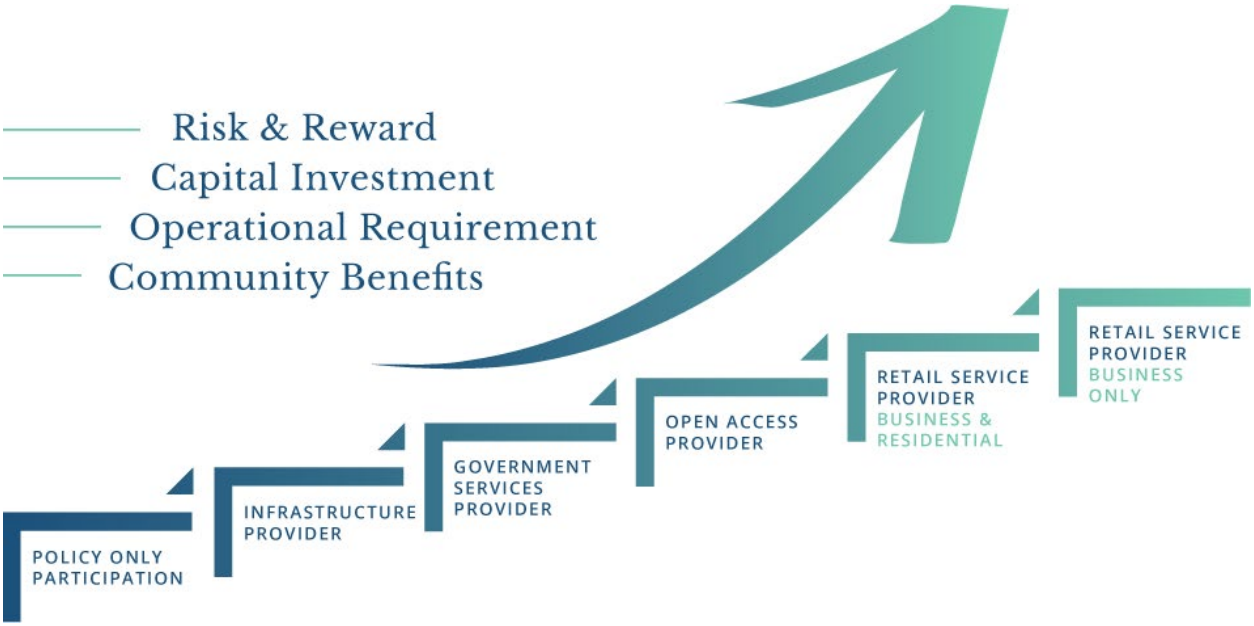
A business model describes how a product or service is developed, operated, and supported. Traditional broadband business models involve enterprises established specifically to provide communications services. The earliest such enterprises were startups that leased telephone lines to provide service. Today, most services are provided by either traditional cable television or telephone companies that added internet access as an optional service via the companies' own infrastructure.

Many local governments and other public enterprises provide broadband or similar services, most only to internal departments and other public agencies. Many also provide free public Wi-Fi access at public facilities. Some provide for-fee services to businesses and residences, competing head-to-head with for-profit providers. Others partner with private companies. There are a range of policies and programs local governments, and other institutions can implement to foster broadband development. Which to implement depends on the factors depicted in Figure 30 and is entirely dependent on the local leadership's view on what Government's Role is in incentivizing and even directly driving broadband investments.

Figure 30 - Inputs to Selecting the Right Broadband Approach

The greatest return on any investment in network assets comes from using them for broadband services. The best, most feasible, and viable business model is one that aligns with the vision of the community, its leadership, and government operations. Becoming a fully functioning provider comes with significant challenges. Lake County leaders will need to make decisions about the level of benefits they hope to achieve and level of investment they are willing to make.

Figure 31 - Risk and Reward Continuum of Broadband Business Models



The business models fall on a continuum, illustrated in Figure 31, that ranges from low risk, low investment options to higher risk, high investment options. As a local government evaluates the various business model options along the continuum, it will encounter 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 potential for profit. Moving "up" the continuum also implies greater local government participation in the delivery of broadband services. Table 13 provides a high-level comparison of the business model options.

Table 13 - Comparison of Public Broadband Options

CONSIDERATIONS	*Passive Government Models*			*Active Government Models*			
	Policy-Only	Infrastructure-Only	Partnerships (P3)	Public-Only	Wholesale Open Access	Business-Only	Full Retail
Services	None	Dark Fiber Only	None	All/Any	Transport	Internet	Internet
Customers	None	Broadband Providers	None	Public Agencies	Broadband Providers	Businesses	Businesses & Residents
Funding	Low	Moderate	Low to High	Moderate	Moderate	Moderate	Moderate
Compete with Providers	No	No	No	No	No	Yes	Yes
Operational Requirements	Low	Low	Low	Low	Moderate	Moderate	Moderate
Regulatory Requirements	Low	Low	Low	Low	Moderate	High	High
Revenue Generation	Low	Low	Low to High	Low	Moderate	High	High
Operational Costs	Low	Low	Low	Low	Moderate	Moderate	Moderate
Financial Risk	Low	Low	Low	Low	Moderate	Moderate	Moderate
Execution Risk	Low	Low	Moderate	Low	Moderate	Moderate	High

PUBLIC BROADBAND DEVELOPMENT BUSINESS MODELS

(a) Policy-only

This is the most passive model and includes permitting, right of way access, construction fees, and franchises that regulate the cost of constructing and maintaining broadband infrastructure within its jurisdiction. This option is not considered a true business model but does significantly affect the local broadband environment and is therefore included as one option.

(b) Infrastructure-only

Municipalities lease and/or sell physical infrastructure, such as conduit, dark fiber, poles, tower space, and property to broadband service providers that need access within the community. These providers are often challenged with the capital costs required to construct this infrastructure, particularly in high-cost urbanized environments. The utility infrastructure provides a cost-effective alternative to providers constructing the infrastructure themselves.

(c) Partnerships

A broadband public-private or public-public partnership (P3) is a negotiated contract between a public entity (i.e., Lake County) and private or public entity to fulfill certain obligations to expand broadband services in a given area. P3s 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. Partnerships can also be formed through the development of grant programs or joint partnerships in applying for funding.

(d) Public-only

These organizations are generally limited to the community anchors that fall within their jurisdiction, including local governments, school districts, higher educational organizations, public safety organizations, utilities, and occasionally healthcare providers. Many of these anchors require connectivity and often, the municipal network provides higher capacity at lower costs than these organizations are able to obtain commercially. This is generally the model that Lake County employs today for its current backbone network.

(e) Open access/wholesale

Municipalities that adopt open-access generally own a substantial fiber-optic network in their communities but do not provide services to consumers. Open access allows these municipalities to "light" the fiber and equip the network with the electronics necessary to establish a "transport service" or "circuit" to service providers interconnecting with the local network. The concept of open access is designed to enable competition among service providers across an open network that is owned by the municipality. The municipality is essentially a "wholesale" provider that retains neutrality and non-discriminatory practices with the providers who operate on the network.

(f) Business-only

Municipalities that provide end users services to business customers are considered retail service providers. Most commonly, municipalities provide voice and Internet services to local businesses. In many cases, a municipality may have built a fiber network for the purposes of connecting the city's primary sites that has been expanded to connect local businesses, in effort to support local economic development needs for recruitment and retention of businesses in the city. As previously stated, there are challenges in the State of Florida that can make providing business-only retail services challenging.

(g) Full retail

Municipalities that provide end user services to businesses and residential customers are considered retail service providers. Most commonly, municipalities provide services to their businesses and residents through a municipally owned public utility or enterprise fund of the city. As a retail service provider that serves businesses and residents, the municipality is responsible for a significant number of operational functions, including management of its retail offerings, network operations, billing, provisioning, network construction, installation, general operations, and maintenance. As previously stated, there are challenges in the State of Florida that can make providing full retail services challenging.