SEMINOLE COUNTY, FL

Broadband Feasibility Study

Deliverable 1
Review of the Current Environment

Magellan
ADVISORS

TABLE OF CONTENTS

TABLE OF FIGURES

TABLES

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, to providing fiber access to schools, to connecting traffic signals, streetlights, and public safety cameras. ***Seminole County has been a leader over the last several decades with this trend having deployed an extensive fiber-optic backbone throughout the County, and more importantly, doing so in close coordination and collaboration with its public partners across the region.***

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 acknowledgement post-COVID, of the importance of connectivity and high-quality Internet services is driving significant investment across the US, and globally. 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 been 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 the ones Seminole 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, cities and cooperatives play a role in expanding broadband directly within their communities today.
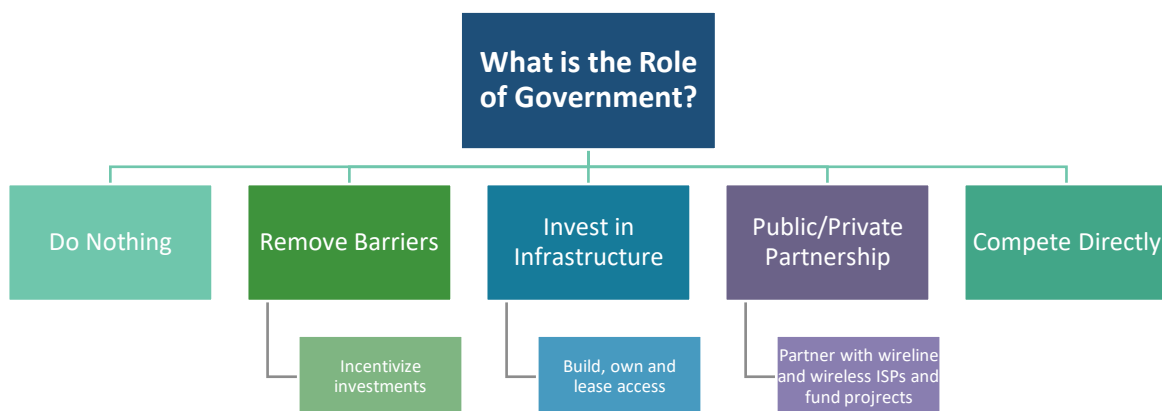
Seminole County has several options to consider as it determines its role in furthering broadband expansion across the County. That includes doing nothing, removing barriers, investing directly in infrastructure, or structuring a public private partnership (P3/PPP), or even competing directly with the 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.

Seminole 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 and simplify 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.

Seminole 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 **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 Seminole 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.

Seminole County commissioned this Broadband Feasibility Study to evaluate the broadband gaps and opportunities to enhance broadband services across the County, and to determine Seminole County Government's role in accelerating broadband deployments in areas that are unserved or underserved as defined by the US Federal government. Seminole 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 Advisors, 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 Seminole County in late 2021 to perform this Study.

FLORIDA DEO BROADBAND PLANNING AND DATA COLLECTION

The DEO's 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 to, and use of broadband Internet service in this 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 is due to the Governor and Florida Legislature by June 30, 2022.

The Act also directs the FOB to provide technical and planning assistance to rural communities for broadband deployment and provides further substance and direction for "local technology planning teams". The FOB is to build and facilitate local planning teams with a membership "representing cross-sections of the community". The local planning teams are to " to help the communities understand their current broadband availability, locate unserved and underserved businesses and residents, identify assets relevant to broadband deployment, build partnerships with broadband service providers, and identify opportunities to leverage assets and reduce barriers to the deployment of broadband Internet services in the community." [3]

The Act also provided an appropriation to DEO for geographical information system mapping of broadband internet service availability consistent with the "reporting standards established by the Federal Communications Commission."[4] The mapping "must identify where broadband-capable networks exist, where service is available to end users, gaps in rural areas, and download and upload transmission speeds."[5] The maps "must receive and verify public input to identify locations in which broadband Internet service is not available, including locations in which broadband Internet service is provided at data transmission speeds below the standard established by the Federal Communications Commission for broadband Internet service, and incorporate such information into the development of the maps. The maps must be complete by June 30, 2022."[6]

However, FCC broadband mapping is known to be inaccurate in that it overreports broadband availability due to its data and methodology. The data is self-reported by broadband providers and is not verified by the FCC. But the bigger issue is that if one home in a census block can get broadband service, the whole census block is "served". Thus, a consumer is not able to tell from the FCC's broadband map with any certainty whether broadband is available or not at a particular address.

These broadband mapping issues become even more urgent when maps are needed to support decisions on deployment of broadband infrastructure. Congress and the FCC attempted to address these issues with the Broadband Deployment Accuracy and Technological Availability Act, or "Broadband DATA act" passed in 2020. Among other things the Broadband DATA Act directs the FCC to collect granular service availability data from wired, fixed wireless and satellite broadband providers, set parameters for service availability data collected from mobile wireless broadband providers, permits the FCC to collect verification data, requires the FCC to establish a crowdsourcing process for data collection, and requires the use of these new maps for new awards of broadband funding. The FCC has implemented a Broadband Data Collection program to improve the accuracy

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[3] F.S. 288.9961 (4)(b).
[4] HB 1239, Section 4.
[5] *Id*.
[6] *Id*.

of broadband maps and create the "broadband serviceable location fabric" for the maps[7] but the maps are not yet available.

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.

As indicated below, Seminole County residents' participation in the State's broadband survey only included 31 tests at 25 sites. Due to the lack of participation, at present the DEO map is not useful to Seminole's planning effort.

Figure 1 - DEO's Broadband Availability Map for Seminole County

PROVISION OF MUNICIPAL BROADBAND IN THE STATE OF FLORIDA

Regulatory and legal hurdles in the State of Florida would make it very difficult for Seminole County to initiate provision of retail broadband services. Seminole 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 "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 or not 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.

Seminole'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 fiber-optic network. As indicated below, there is a significant number of public facilities and locations throughout the County, fortunately however, Seminole County has connected the bulk of these sites over the years using the County's existing fiber network.

The map of county sites and other points of interest are depicted below to provide a frame of reference in the County.

Figure 2 - County Point of Interest Map
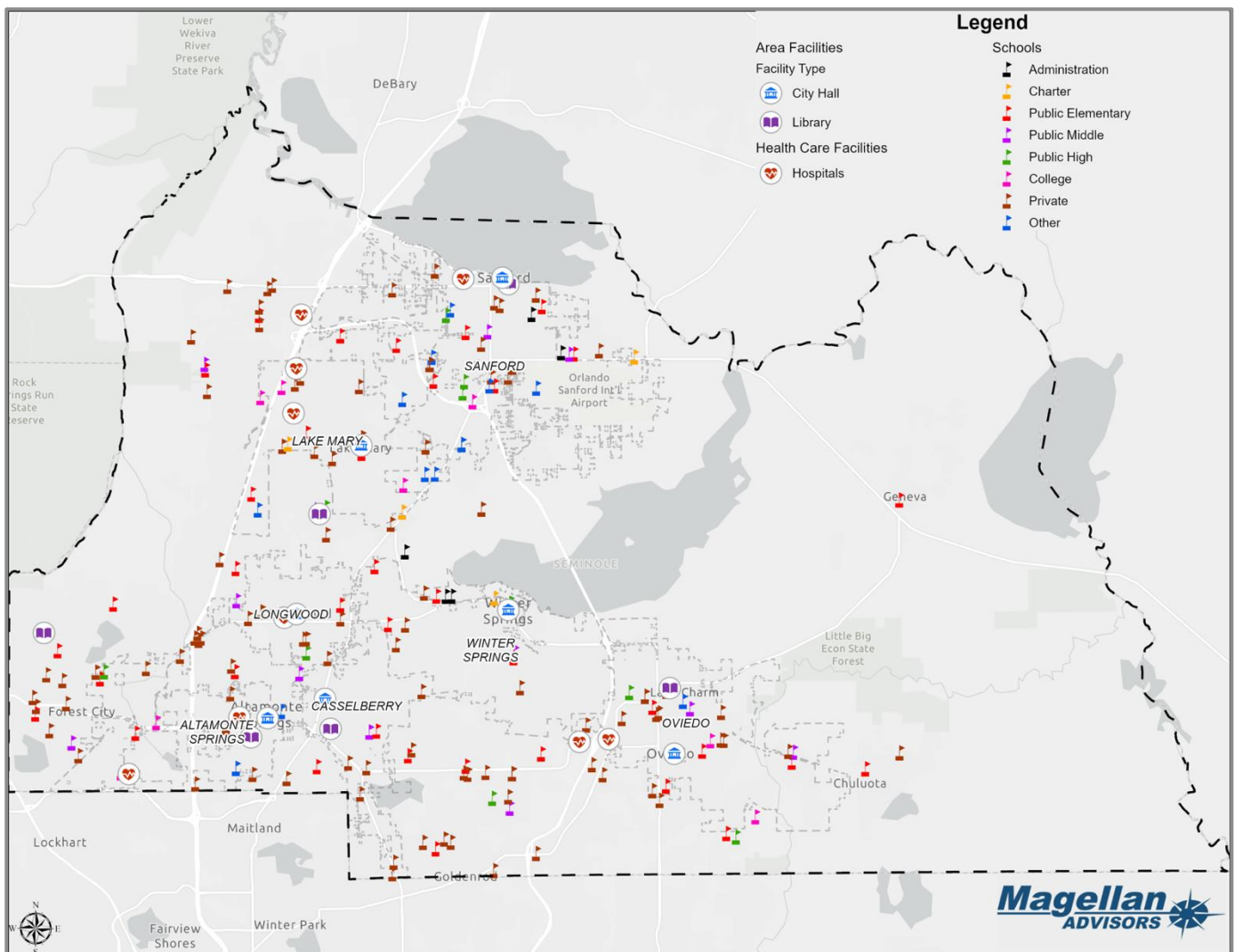
(b) Population Density

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 3 - County's Population Density Map by Census Blocks
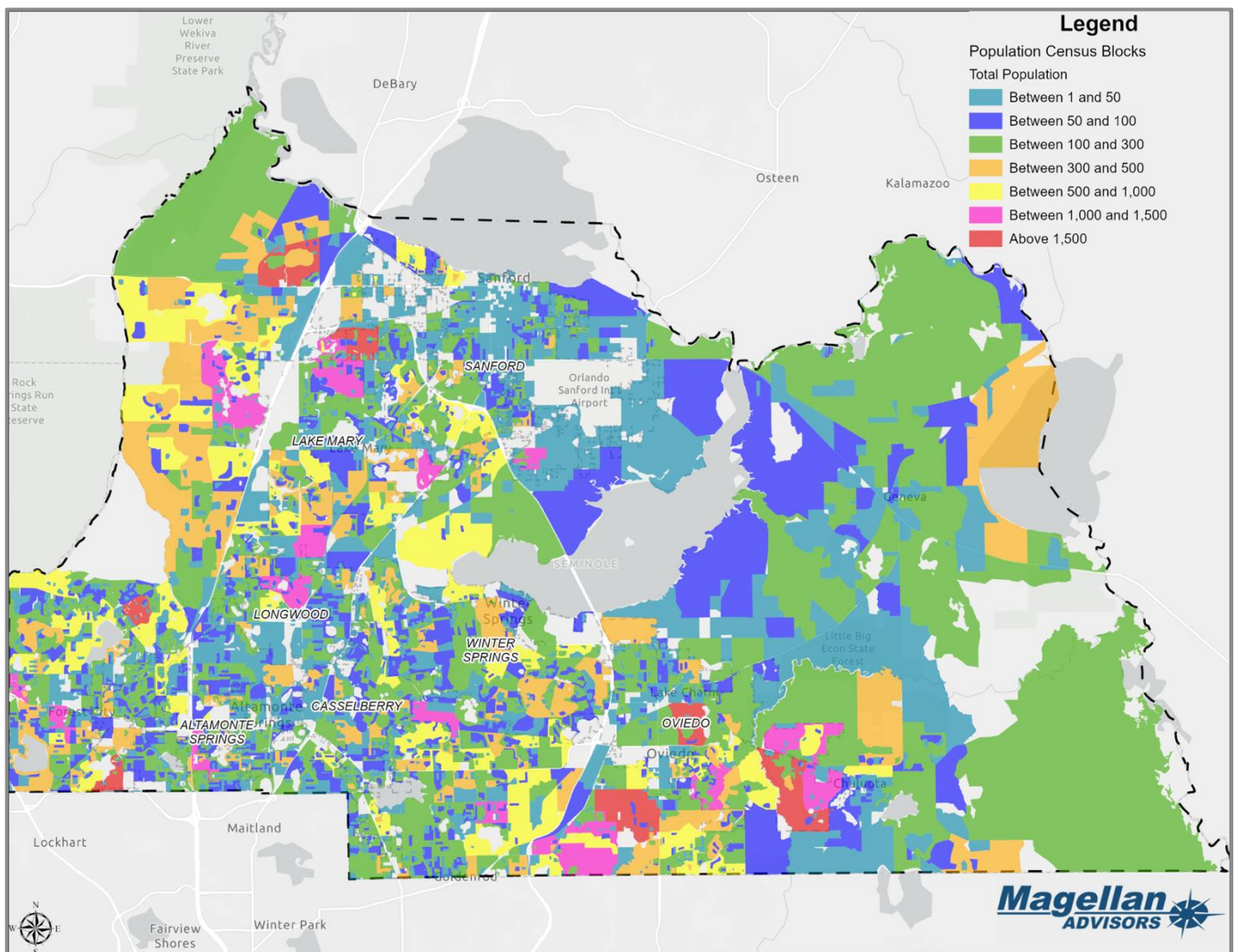
(c) HUD/Low Income Eligible Areas

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 4 - HUD/Low Income Eligible Areas Map by Low-Mod Percentage
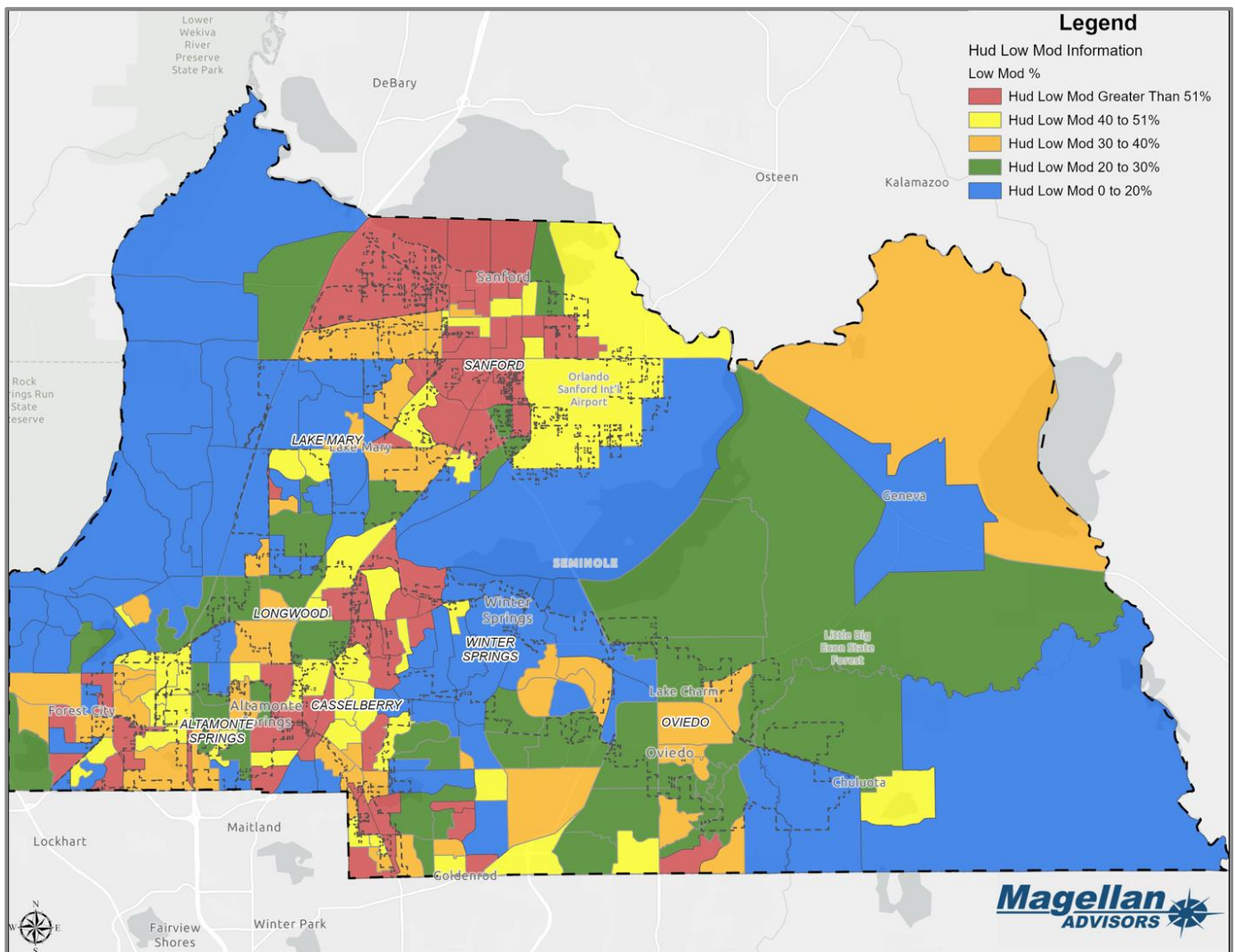
The map below indicates specific eligible areas given the Low/Mod indicators, and identifies high-poverty communities, economically distressed areas, low-income areas, and rural distress areas.

Figure 5 – CDBG Funding Eligible Areas Map
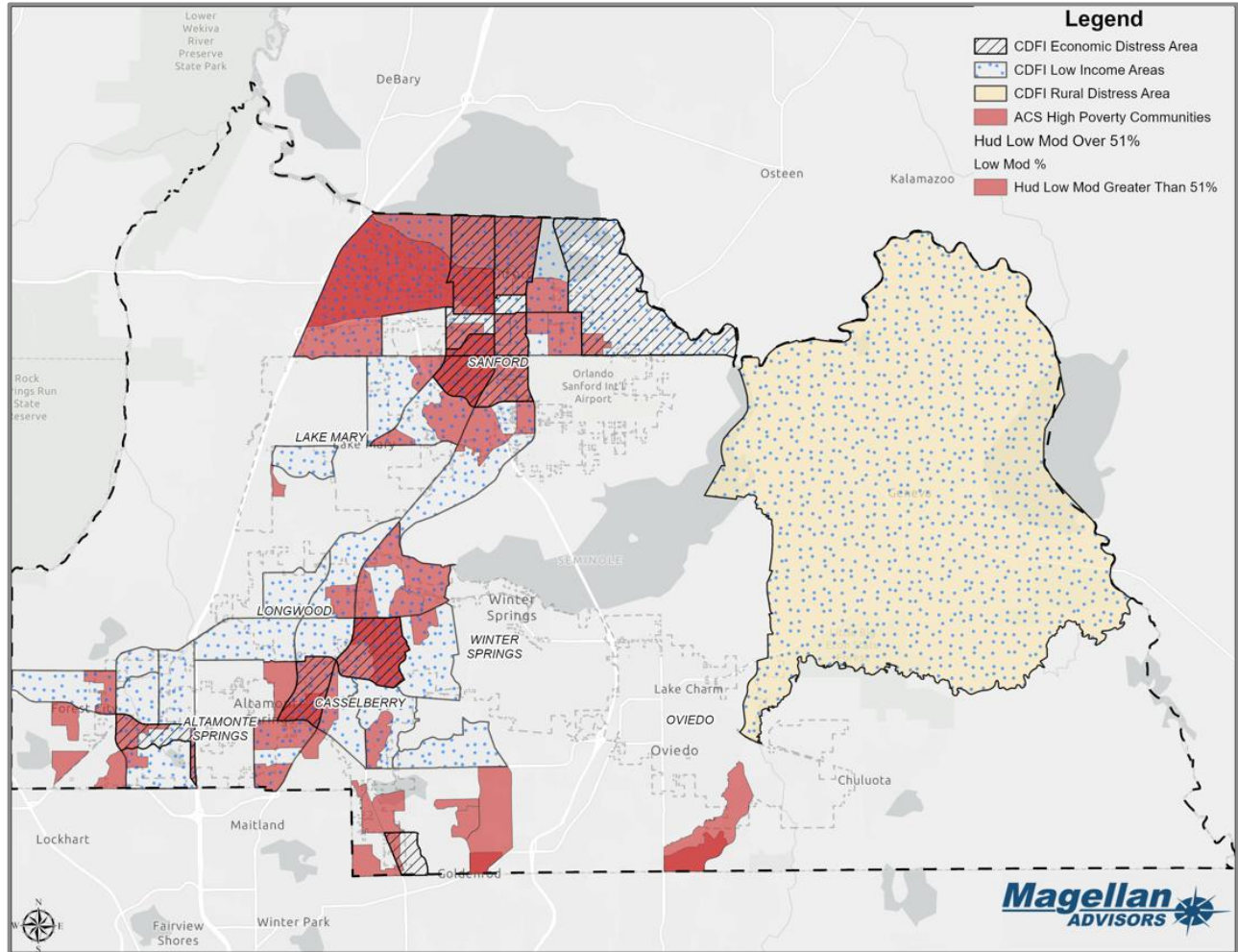
(d) Towers in Seminole County

Magellan was able to identify publicly-owned and privately owned towers throughout the County – they are depicted here. 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. The majority of towers deployed in Seminole County are owned by private sector entities.

Figure 6 - Seminole County Towers Map by Ownership
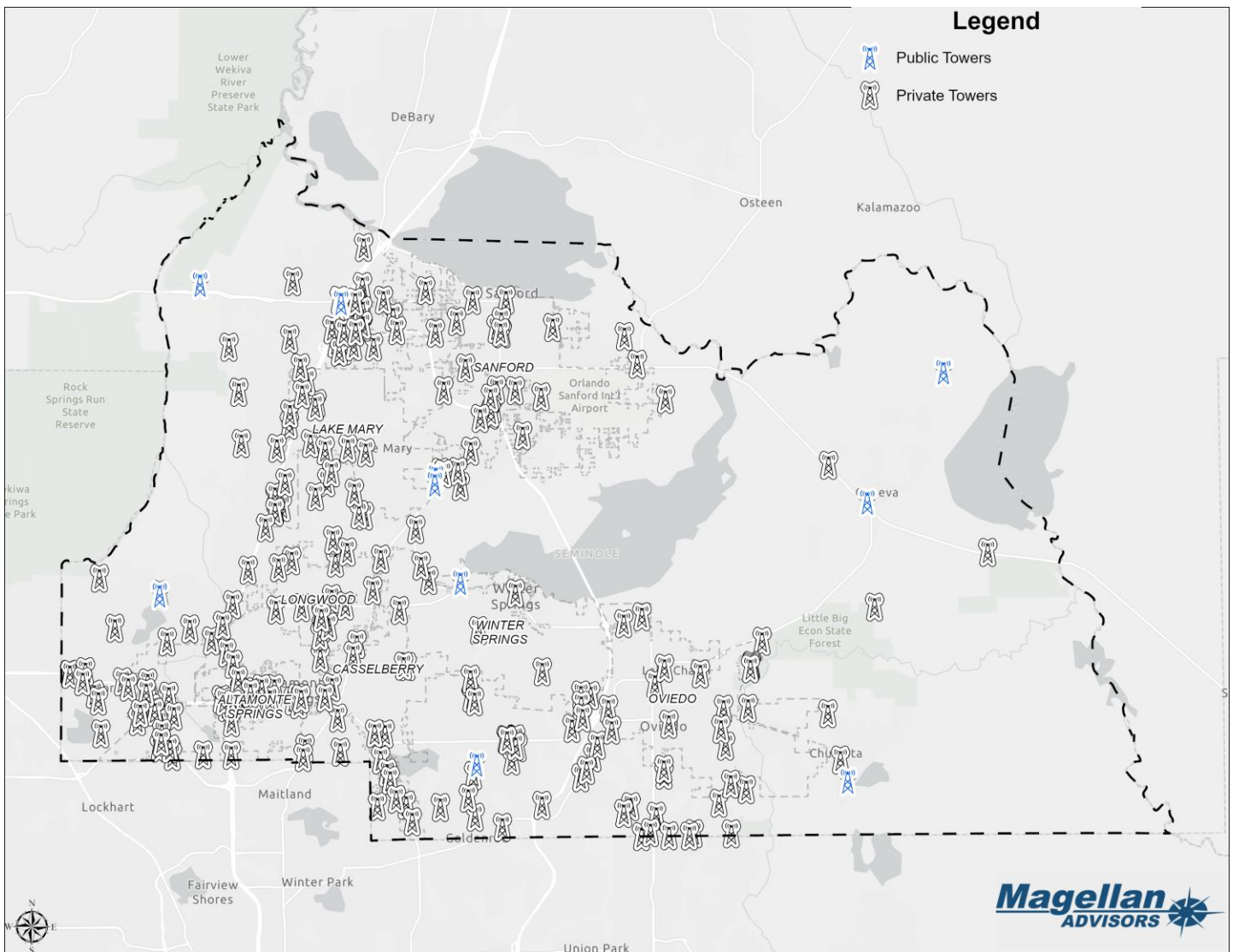
The table in Appendix 1 provides details on each tower's owners and locations. Height, street address and Lat/Long coordinates are also included.

(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. Lumen (formerly CenturyLink) provides business and residential services. Level 3 (which is now part of CenturyLink/Lumen), Uniti, Crown Castle and Windstream provide custom business connections. AT&T and Spectrum do not contribute their fiber routes, but both provide business and residential services widely across Seminole County.

Figure 7 - Seminole County's Long Haul Fiber Routes by Provider
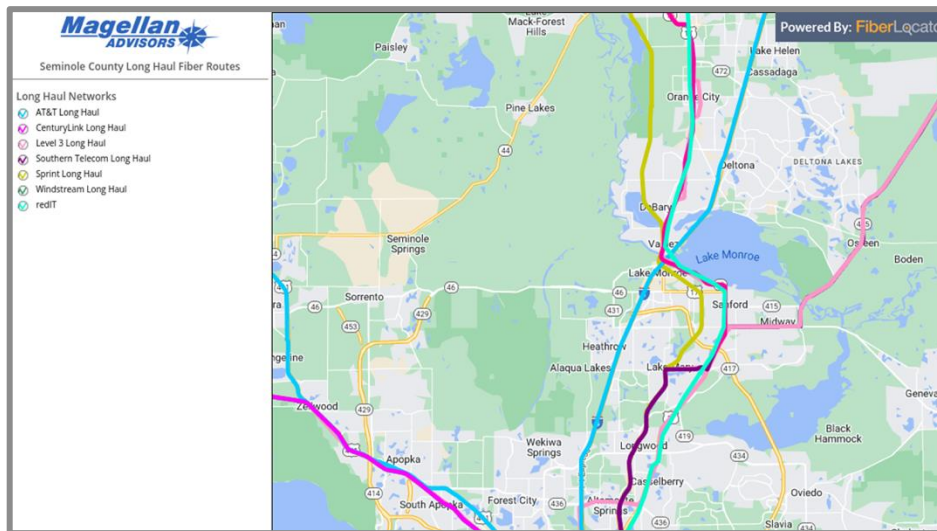
Figure 8 - Seminole County's Metro Fiber Routes by Provider
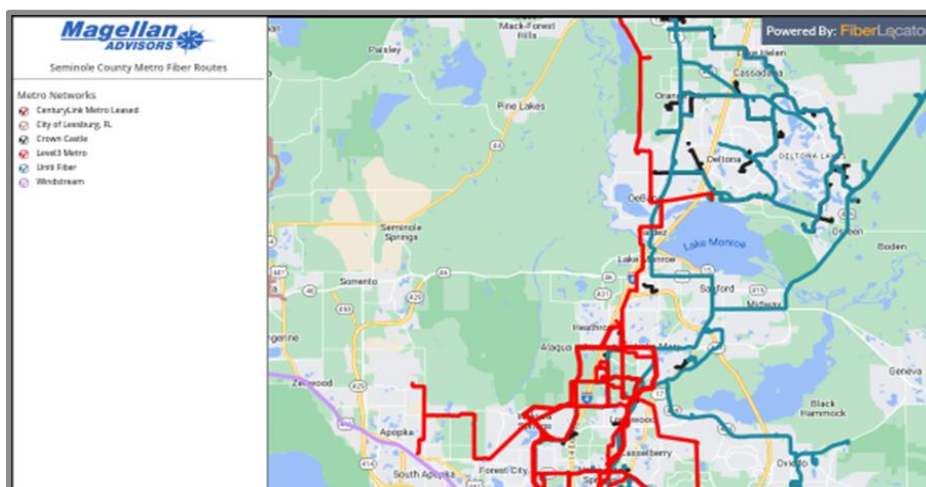
The map below shows connected buildings in the area. Lumen lists the most buildings, with AT&T as the second. AT&T does not show their fiber routes but does show connected buildings. Data on these offerings is shown in the Market Analysis section of this document. Lumen has DSL and fiber connected buildings.

Figure 9 - Fiber Connected Budlings in Seminole County by Provider
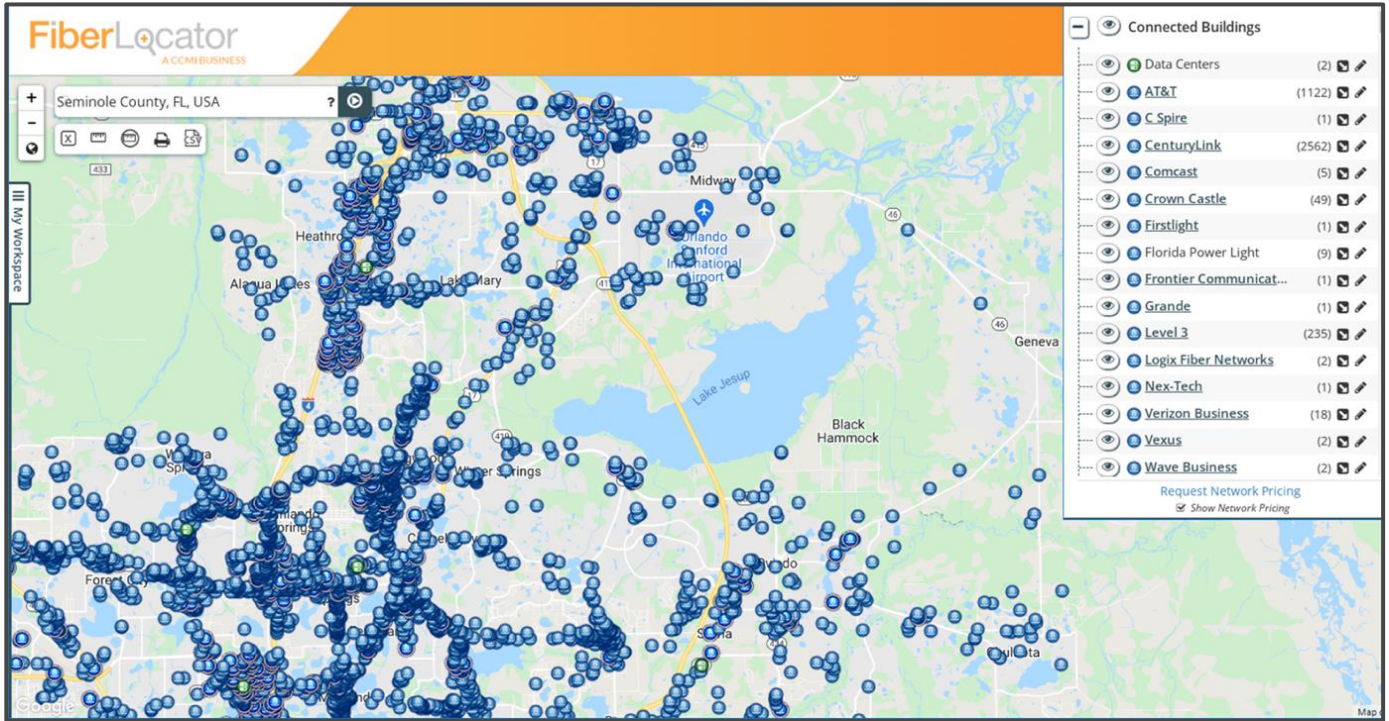
(f) Served, Underserved and Unserved (477 Maps)

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	Less than 10 Mbps down/1 Mbps up
Underserved	At least 10 Mbps down/1 Mbps up and less than 25 Mbps down/3 Mbps Up
Served	At or above 25 Mbps down/3 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.

Figure 10 – FCC 477 2020 Data Map by Maximum Download Speed in Mbps
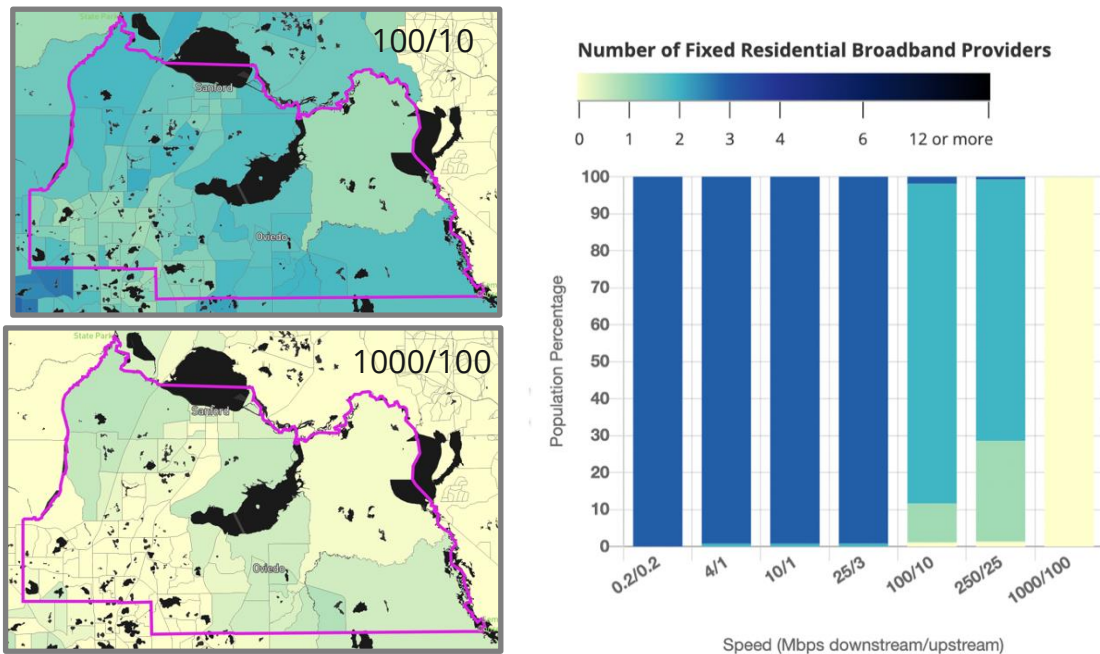
A newer data source published by NTIA in 2021, further refines the 477 data and incorporates additional metrics and speeds to determine availability.

Figure 11 – NTIA's 2021 Data Map by Maximum Download Speed in Mbps
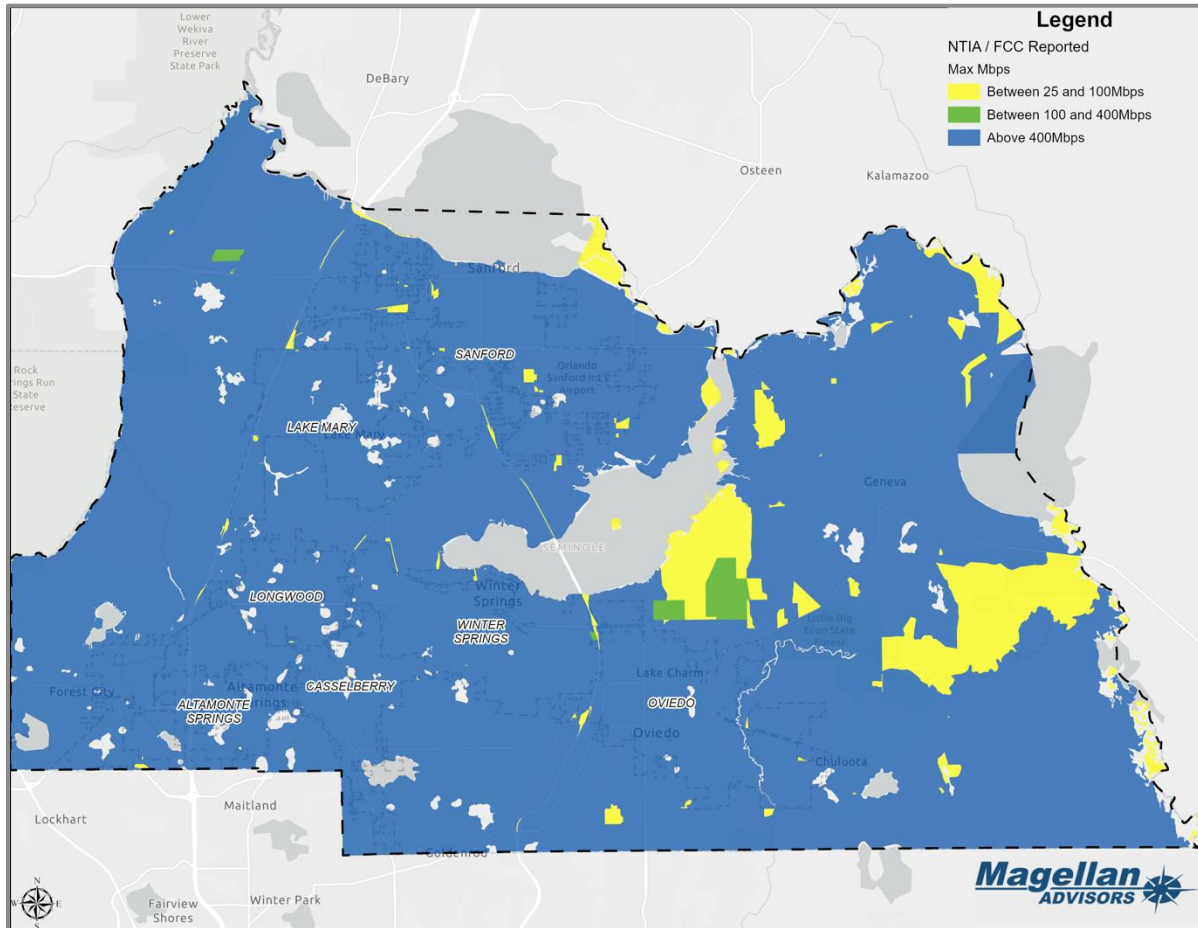
(g) Rural Digital Opportunity Fund (RDOF)

There are no RDOF eligible areas in Seminole County.

(h) USDA Rural Utility Services

There are no USDA RUS eligible areas or data available for Seminole 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 Seminole county, FCC 477 maps are shown below for Verizon, T-Mobile, and AT&T. The FCC 477 maps for cellular 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 eastern 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 shows areas in Sanford, Altamonte Springs, Geneva, Forest City and Casselberry with below 10 Mbps speeds. This map shows few to no towers built in the far eastern portion of the county. It also indicates a lack of towers in some of the more populated areas that have lower throughput.

Figure 12 - FCC's 477 Map of Cellular Coverage Reported by AT&T
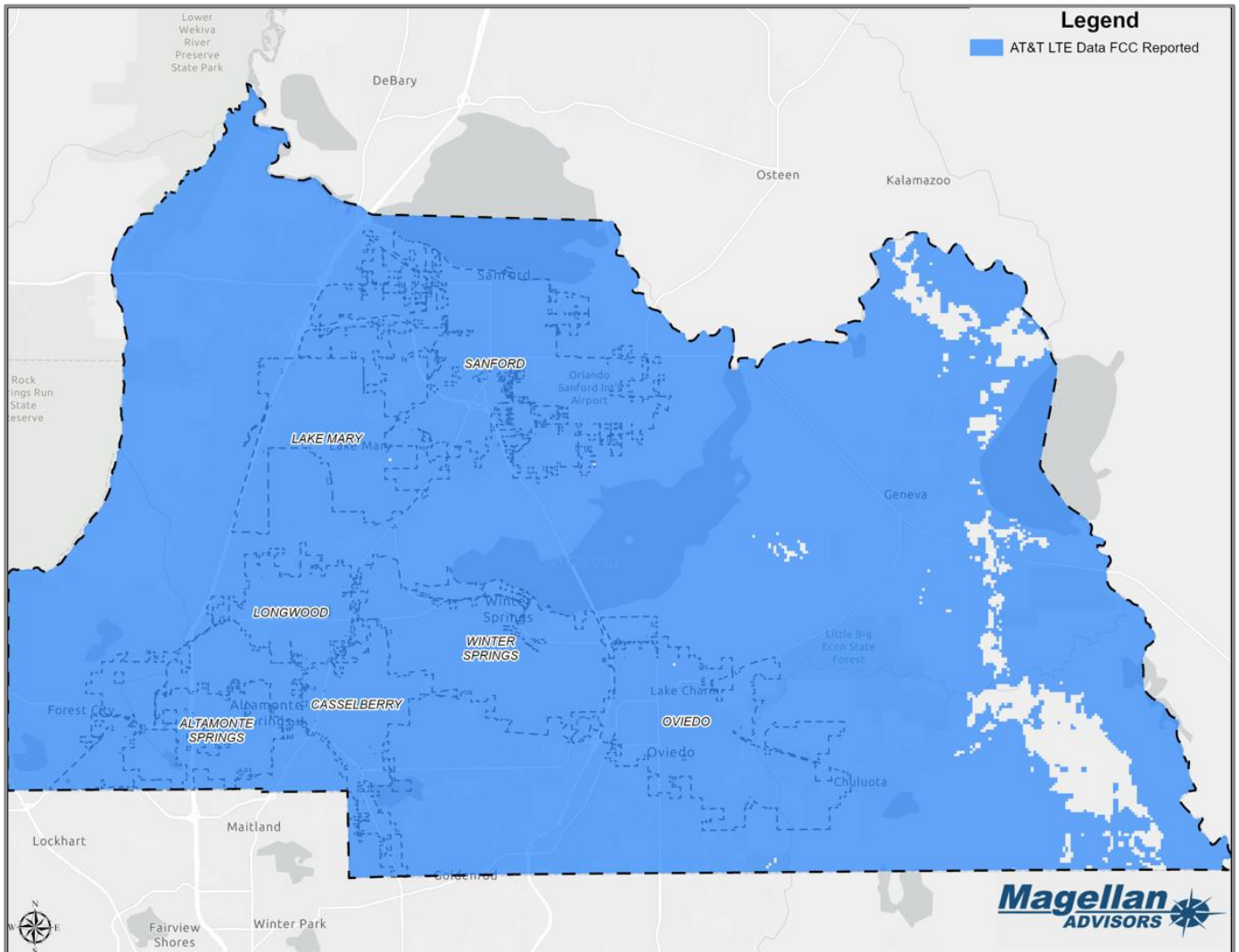
Figure 13 - FCC's 477 Map of Cellular Coverage Reported by Verizon
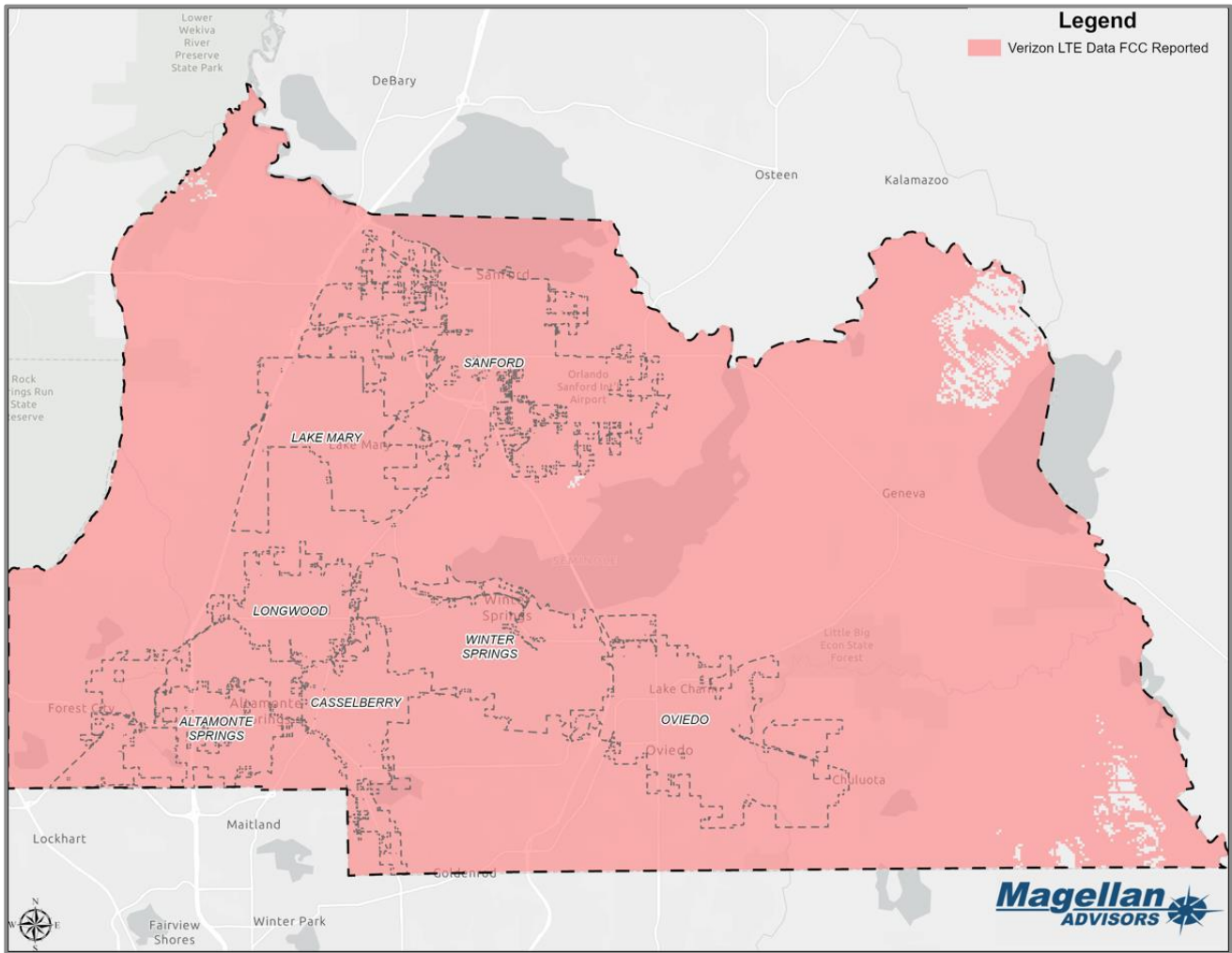
Figure 14 - FCC's 477 Map of Cellular Coverage Reported by T-Mobile LTE
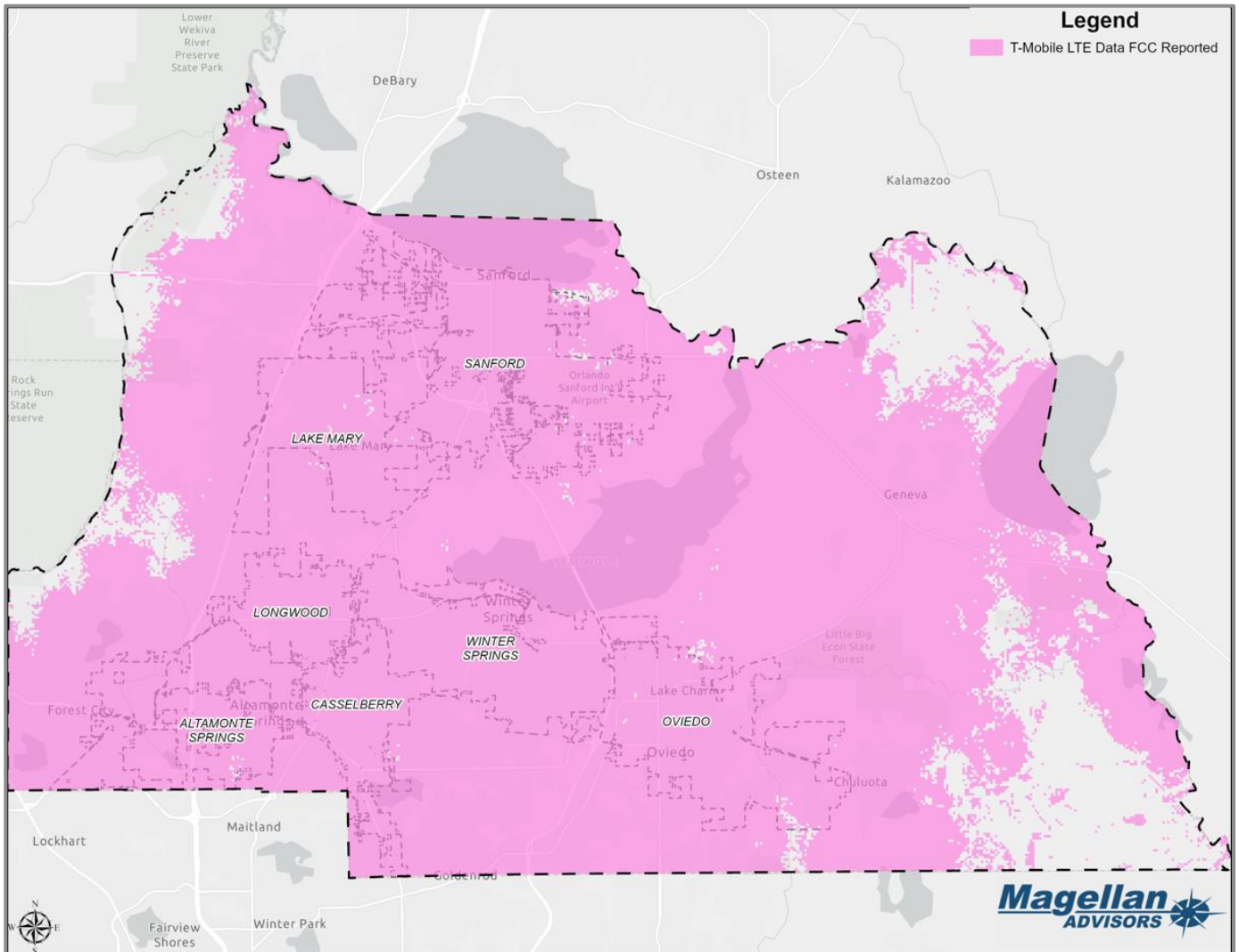
Figure 15 - Ookla's Mobile Speed Test Map by Download Speeds in Mbps

Legend

Communication Towers

Ookla 2021 Mobile Speed Tests

- Mobile Below 10Mbps
- Betwen 10 and 25Mbps
- Between 25 and 100Mbps
- Between 100 and 400Mbps
- Mobile Above 400Mbps
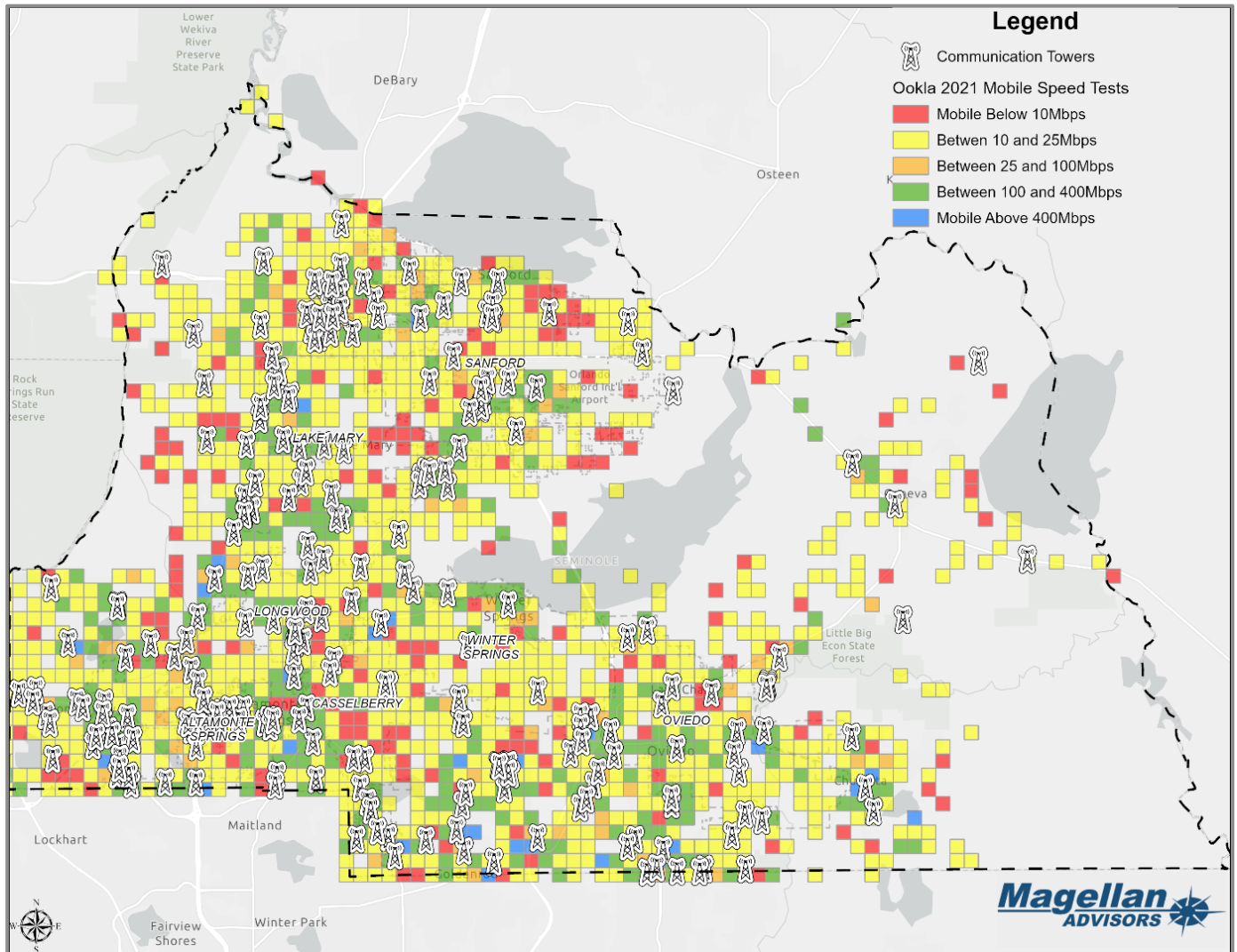
(j) Seminole County Consumer Survey and Speed Test

The map below shows the speed test data recorded from the Magellan 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.

Figure 16 - Speed Test Results from Survey (unserved and underserved)
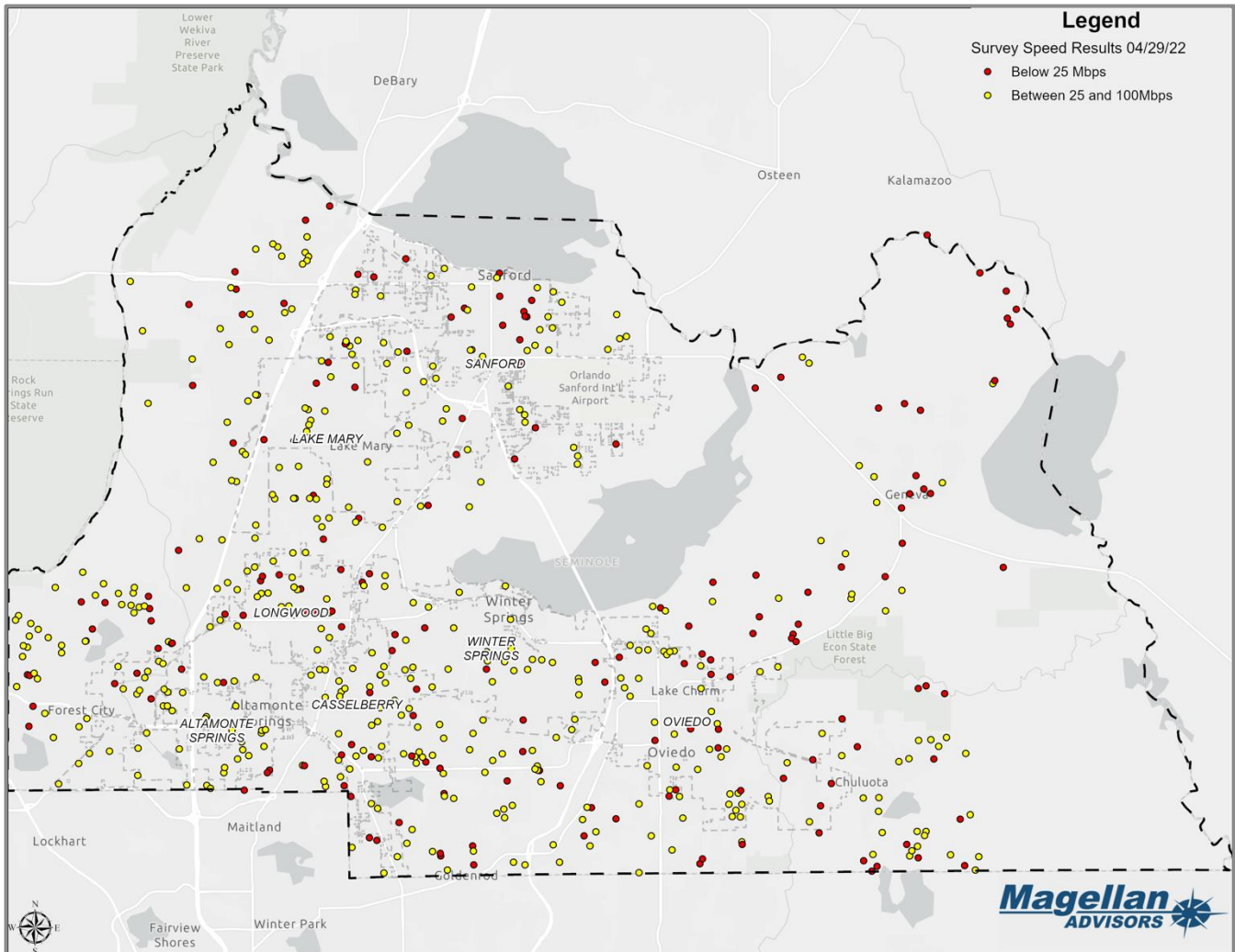
The map below is Ookla recorded speed test data. The red and yellow blocks are unserved. The orange blocks are underserved. The eastern portion of the county register's most of these blocks, but there are others particularly in between Geneva and Oviedo.

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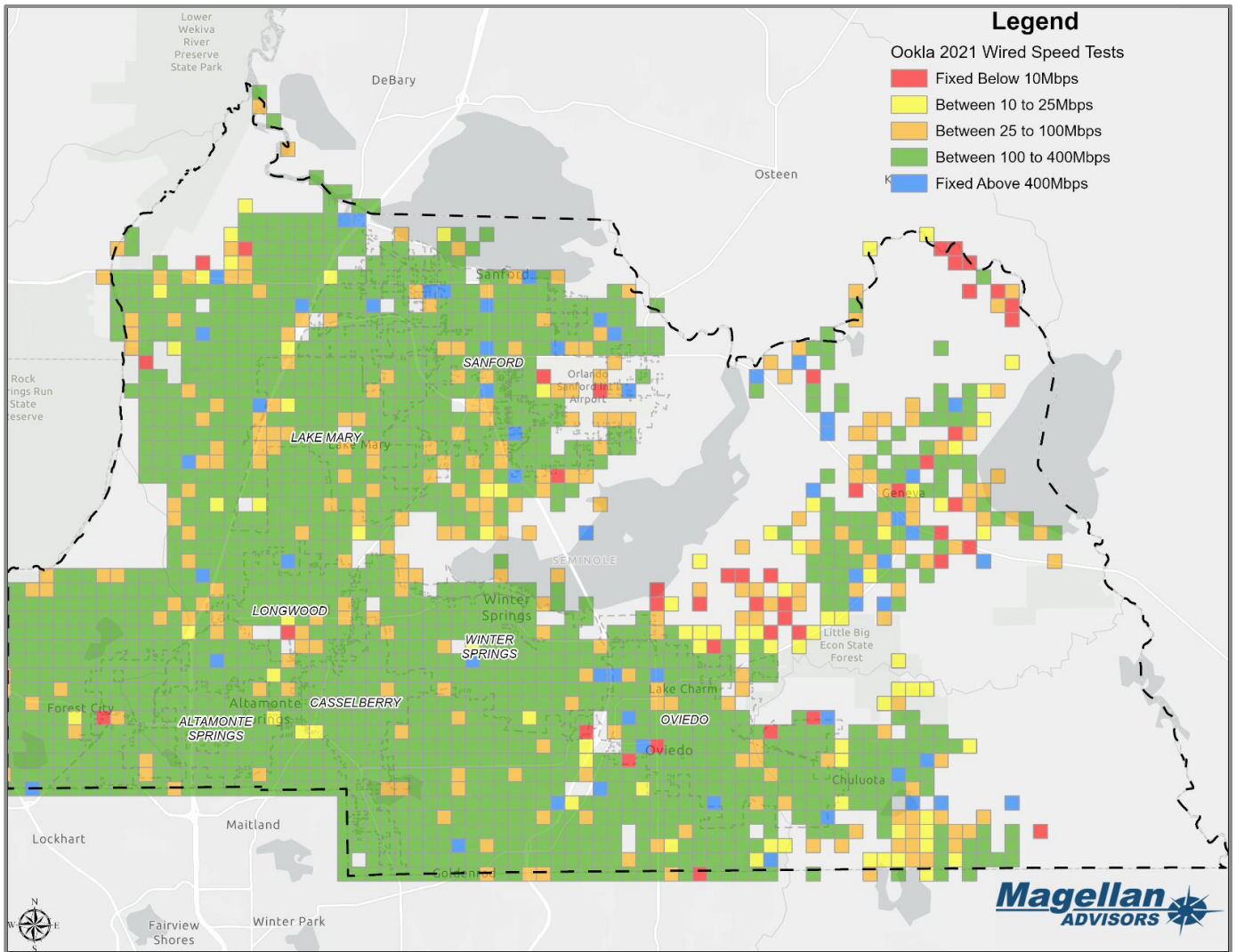
Market Analysis

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 and groups of concern detailed in this report. Therefore, Magellan have gathered, verified, and analyzed various data sources on Seminole 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:

- There are **underserved areas** around Seminole that are repeatedly identified through different data resources.
  - Base rates are generally available Countywide, but as you seek the higher speed services, the areas of coverage diminish greatly. The FCC map shows that areas in **Altamonte Springs**, **Casselberry**, **Longwood,** and **Geneva** 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 **Sanford**, **Longwood**, **Geneva**, **Altamonte Springs**, and Southeast part of the County.
- **Satellite** and **cable** type of connections are the most widely available options in Seminole County but are not considered reliable nor cost effective.
- Spectrum is Seminole County's primary MSO/cable operator and offers its last-mile residential services over a copper (HFC – hybrid fiber/coax) connection.
  - Survey responses show that more than half of the citizens experience slowdowns and outages several times a month.
- There is an **increasing demand for bandwidth** specifically for citizens' personal development, telehealth, school, and telecommuting uses.
- There are plenty of resources and even devices that are available for the County citizens use such as laptops, Chromebooks distributed to students in need, and other mobile devices, but cannot be utilized or maximized due to the **lack of connectivity**. This leads to the waste of resources and lost opportunities.

METHODOLOGY

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

- **Ookla's Speed Test Data**[8]
- **FCC's Fixed Broadband Deployment Map**[9]
- **Market Research** – BroadbandNow.com[10], 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, Seminole County residents are paying anywhere from $0.04 (AT&T's 5GIG Fiber plan) per megabit to $6.00 (AT&T's Fixed wireless plan) 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. In communities providing fiber-optic broadband services, where residents are paying approximately $80 for 1 Gbps download (1,000 Mbps), they are paying **$0.08** per megabit[11]. 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 Advisors 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.

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[8] https://www.speedtest.net/global-index/united-states
[9] https://go.usa.gov/xuHQ2
[10] 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/
[11] https://www.cnet.com/home/internet/best-fiber-internet/

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.

The FCC's 2015 definition of broadband and its classification is broken down below[12]:

Unserved areas in which households and businesses lack access to broadband service speeds that meet the FCC threshold of 25/3 Mbps

Underserved areas in which households and businesses lack access to broadband service speeds that meet the FCC threshold of 100/10 Mbps

Served areas in which households and businesses have access to broadband service speeds that meet the FCC threshold of 100/10 Mbps and above

Figure 18 - Activity Bandwidth Requirement
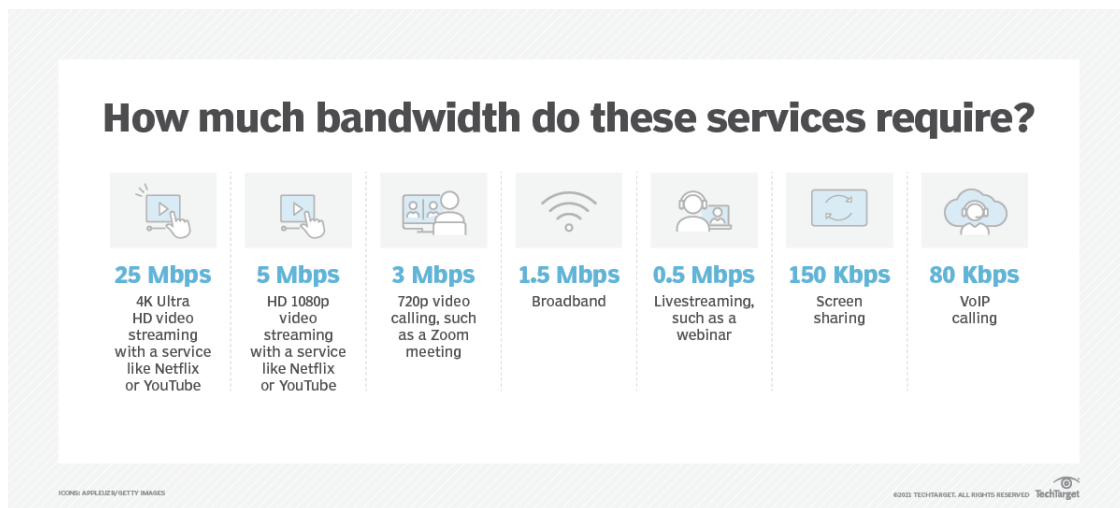
BROADBAND ENVIRONMENT IN SEMINOLE

(a) Ookla Speed Test Data - U.S. Baseline Coverage[13]

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 May 2022, the nationwide USA median fixed Internet download speed is 151.46 Mbps, and median upload speed is 21.03 Mbps. At a global level, the U.S. ranked 8th 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.

For mobile or cellular connections, the country's median download speed is 61.12 Mbps, and median upload speed is 8.60 Mbps. At a global level, the U.S. ranked 23rd 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 33rd in the USA, with a median download speed of 52.94 Mbps and upload speed of 7.66 Mbps, having T-Mobile as the fastest provider.[14]

(b) FCC Form 477 Mapping Data[15]

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

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[13]https://www.speedtest.net/global-index/united-states#fixed
[14] https://www.speedtest.net/global-index/united-states#mobile
[15] https://go.usa.gov/xuHQ

Figure 20 - FCC's Number of Fixed Residential Broadband Providers by Speeds
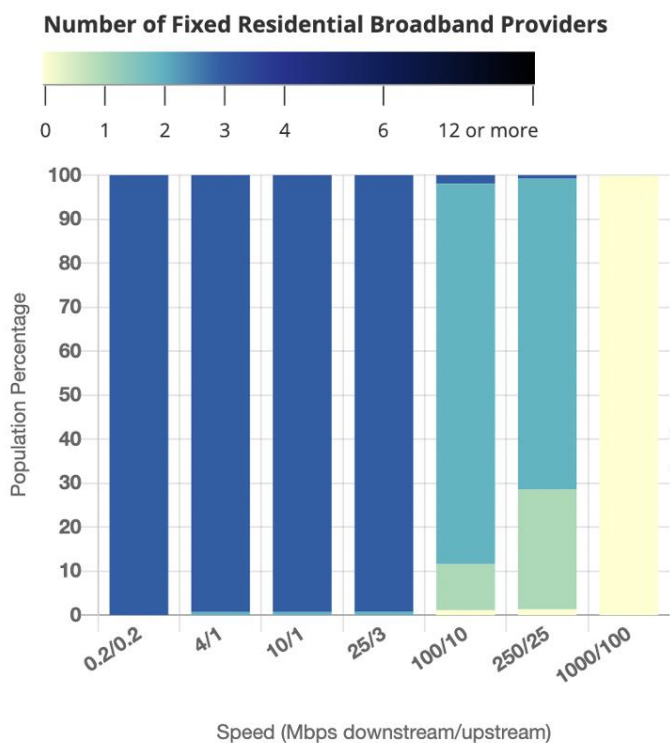
Figure 19 - Number of Providers Providing 25/3
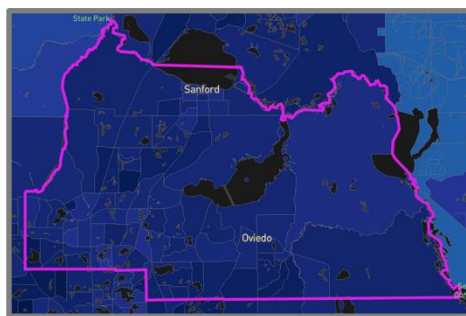
Figure 21 - Number of Providers Providing 100/10
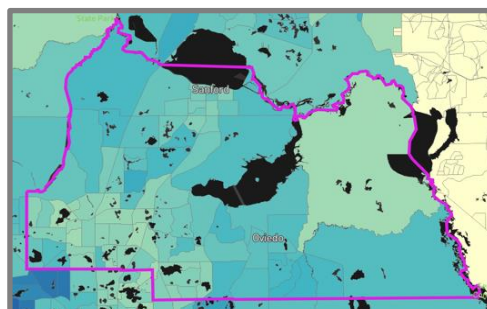
Figure 22 - Number of Providers Providing 1000/100
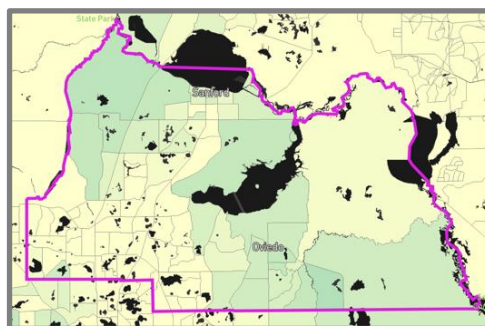
As shown in Figure 20 above, there are more than 3 ISP[16]s around the entire County that are offering 25/3 Mbps speed services. While Figure 21 shows that there are less ISP options that offer 100/10 Mbps download speeds. More specifically, areas in Altamonte Springs, Casselberry, Longwood, and Geneva have one to no available providers providing a speed equal to or greater than 100/10 Mbps. Finally, a Gig service or a speed of 1000/10 Mbps is scarce in the County, as the map in Figure 22 shows that 78.81% of the County have 0 providers offering this speed. Areas in Oviedo and Sanford are the only two parts of the County where there is at least 1 provider offering this speed.

[16] Internet Service Provider

(c) Market Research

An assessment of private-sector telecommunications infrastructure and services in Seminole 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[17] and each website of the major providers in the area.

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

Table 1 - Major Internet Service Providers in Seminole Count[21]

RESIDENTIAL			BUSINESS		
Provider	% County Availability	Type of Connection	Provider	% County Availability	Type of Connection
Viasat Internet	100%	Satellite	Florida High Speed Internet	100%	Fixed Wireless, Fiber
HughestNet	100%	Satellite			
Spectrum	99.7%	Cable	Spectrum	95.6%	Cable, Fiber
CenturyLink/ Lumen	50.1%	DSL, Fiber	CenturyLink Business	48.5%	DSL, Fiber
AT&T	47.4%	DSL, Fiber	AT&T	18.2%	DSL, Fiber
T-Mobile 5G Home Internet	40.6%	5G Internet	Crown Castle	13.5%	Fiber
Verizon	3.6%	Fixed Wireless	Smart City Telecom	4.4%	Fiber
Xfinity	0.7%	Cable	Kinetic by Windstream	6.5%	Copper, DSL
Summit Broadband	0.3%	Cable	Verizon Business	3.5%	Copper
			Comcast Business	1.6%	Cable
			Uniti	1.2%	Fiber

[17] 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/

			GTT	0.6%	Copper

To confirm each of the advertised service offerings by the providers mentioned in the table above, Magellan dived 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

RESIDENTIAL ADDRESS	Service	Spectrum	AT&T	Century Link	T-Mobile Fixed Wireless
1108 Woodbine St, Fern Park, FL 32730	40 Mbps			$65.00	
	200 Mbps	$49.00	N/A		$50.00
	400 Mbps	$69.99			
	1 Gbps	$89.99			
5171 Sabal Branch Cv, Oviedo, FL 32765	3 Mbps			$65.00	
	200 Mbps	$49.00	N/A		$50.00
	400 Mbps	$69.99			
	1 Gbps	$89.99			
117 Jane Creek Dr, Geneva, 32732	200 Mbps	$49.00	N/A	NA	N/A
	400 Mbps	$69.99			
	1 Gbps	$89.99			
4073 Silverstream Ter, Sanford 32771	300 Mbps		$55.00	N/A	N/A
	400 Mbps	$39.99			
	500 Mbps		$65.00		
	1 Gbps	$79.99	$80.00		
2415 Mount Royal Pl, Chuluota, FL 32766	100 Mbps		$55.00	N/A	N/A

Address	Speed				
1275 Jasmine Rd, Forest City, FL 32703	15 Mbps			$65.00	N/A
	200 Mbps	$49.00	N/A		
	400 Mbps	$69.99			
	1 Gbps	$89.99			
488 Misty Oaks Run, Casselberry, FL 32707	3 Mbps			$65.00	
	200 Mbps	$49.00	N/A		$50.00
	400 Mbps	$69.99			
	1 Gbps	$89.99			
156 Seminole Ave, Lake Mary, FL 32746			N/A	N/A	N/A
	30 Mbps	$17.99			
	100 Mbps	$29.99			
	200 Mbps	$49.99			
	400 Mbps	$69.99			
	1 Gbps	$89.99			

In the section below are the providers' published service offerings for Seminole County's residents and businesses. The prices shown below are **Internet-only** plans to allow more consistent comparisons. It is important to note that 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 as shown on the tables in the sections below.

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 of its County customers, its service reliability may be an area of major concern. The standard service offerings are shown in the table below.

The market research performed by Magellan shows that Spectrum's residential service offerings are 99.7% available in Seminole County. On the other hand, business offerings are 95.6% available in the County.

Table 3 – Spectrum's Published Residential Internet Service Offerings in Seminole County[18]

Package	Type of Connection	Download Speed[19]	MRC[20]	MRC per Mbps[21]	Notes
Spectrum Internet	Cable	200 Mbps	$74.99	$0.37	Unlimited Data, plus WI-FI fee
Internet Ultra	Cable	400 Mbps	$94.99	$0.24	Unlimited Data, plus WI-FI fee
Internet Gig	Cable	1 Gbps	$119.99	$0.12	Unlimited Data, plus WI-FI fee

[18] https://www.spectrum.com/internet-service/florida/seminole-county
[19] Speeds are in megabits per second (Mbps) download over megabits per second upload. cited in this section are those advertised by providers and should be considered maximum possible speeds. Actual speeds are likely to be lower.
[20] MRC is "monthly recurring cost."
[21] This metric is the MRC divided by the download speed in Mbps

Table 4 - Spectrum's Published Business Internet Service Offerings in Seminole County[22]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
Spectrum Internet	Cable	200 Mbps	$64.99	$0.45	Unlimited Data , plus WI-FI fee
Internet Ultra	Cable	600 Mbps	$114.99	$0.23	Unlimited Data, plus WI-FI fee
Internet Gig	Cable	1 Gbps	$164.99	$0.19	Unlimited Data, no WI-FI fee

Viasat, formerly known as Exede is a major satellite communications provider in Seminole 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 4 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.

The market research performed by Magellan shows that Viasat's residential service offerings are 100% available in Seminole County.

Table 5 – Viasat's Published Residential Internet Service Offerings in Seminole County[23]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	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

[22] https://www.spectrum.com/business/internet
[23] https://buy.viasat.com/en-US/r/pln

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
Unlimited Platinum 100	Satellite	100 Mbps	$199.99	$0.20	150 GB High Speed-Data

HughesNet. HughesNet offers similar plans as Viasat in Seminole 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.

The market research performed by Magellan shows that HughesNet's residential service offerings are 100% available in Seminole County. Areas have varying availabilities between 0% to 98% coverage.

Table 6 - HughesNet's Residential Monthly Subscription Rate per Download Speed in Mbps[24]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	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

LUMEN® CenturyLink now rebranded as Lumen is available to 37 states in the U.S.[25] is continuously expanding its residential fiber service 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.

[24] https://internet.hughesnet.com/order-online/product-selection/
[25] https://broadbandmap.fcc.gov/#/provider-detail?version=dec2020&direction=d&hoconums=130228

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.

The market research performed by Magellan shows that CenturyLink's residential service offerings are 50.1% available in Seminole County. Different neighborhoods have varying availabilities between 0% to 98% service coverage. On the other hand, business offerings are 48.5% available in Seminole County, with varying availabilities between 0% to 94% per area.

Table 7 -CenturyLink's Residential Monthly Subscription Rate per Download Speed in Mbps[26]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
CenturyLink Simply Unlimited Internet	DSL	100 Mbps	$50	$0.50	Unlimited Data, No Annual Contract
CenturyLink Fiber Internet	Fiber	940 Mbps	$65	$0.06	Unlimited Data, No Annual Contract

Table 8 - CenturyLink's Small Business Monthly Subscription Rate per Download Speed in Mbps[27]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
Small Business Internet	DSL	100 Mbps	$50	$0.50	Unlimited Data, No Annual Contract
Fiber Internet	Fiber	940 Mbps	$65	$0.06	Unlimited Data, No Annual Contract

AT&T is a Fixed Wireless and Fiber provider. The company announced the launch of their 2-Gig and 5-Gig speed services in January of 2022[28]. Since then, they also increased the price of their hybrid DSL-fiber technology called "AT&T Internet" $3 per month due to the continuous increase in its demands.[29] AT&T's service pricing varies per location.

The market research performed by Magellan shows that AT&T's residential service offerings are 47.4% available in Seminole County. Different neighborhoods have varying availabilities between 0%

[26] https://internet.centurylink.com/lp/
[27] https://www.centurylink.com/small-business/business-internet/
[28] https://www.fiercetelecom.com/broadband/att-upgrades-its-fiber-network-offer-2-gig-5-gig-speeds
[29] https://www.fiercetelecom.com/broadband/att-internet-raises-prices-3-month

to 40% service coverage. On the other hand, business offerings are 18.2% available in Seminole County, with varying availabilities between 0% to 43% per area.

Table 9 - AT&T's Residential Monthly Subscription Rate per Download Speed in Mbps[30]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
AT&T Fixed Wireless internet - Standalone	Fixed Wireless	10 Mbps	$59.99	$5.99	Pricing for residential customers only. Overage charges: Plan includes 350 GB data allowance per month. $10 per 50 GB of additional data up to a maximum of $200 per month. All data allowances, incl. overages, must be used in billing period in which allowance is provided.
AT&T Internet Plan – Internet 25	DSL-Fiber	25 Mbps	$65	$2.60	$10 charge applies for each additional 50GB (up to $100/mo). Unlimited data allowance may also be purchased separately for an add'l $30/mo.
AT&T Internet Plan – Internet 50	DSL-Fiber	50 Mbps	$65	$1.10	$10 charge applies for each additional 50GB (up to $100/mo). Unlimited data allowance may also be purchased separately for an add'l $30/mo.
AT&T Internet Plan – Internet 100	DSL-Fiber	100 Mbps	$65	$0.65	$10 charge applies for each additional 50GB (up to $100/mo). Unlimited data allowance may also be purchased separately for an add'l $30/mo.
AT&T Fiber® Plan - Internet 300	Fiber	300 Mbps	$55	$0.18	
AT&T Fiber® Plan - Internet 500	Fiber	500 Mbps	$65	$0.13	

[30] https://www.att.com/internet/internet-service-plans/

Package	Type of Connection	Download Speed[20]	MRC[24]	MRC per Mbps[25]	Notes
AT&T Fiber® Plan - Internet 1000	Fiber	940 Mbps	$80	$0.08	
AT&T Fiber® Plan – 2 GIG	Fiber	2GIG	$110	$0.05	
AT&T Fiber® Plan –5 GIG	Fiber	5GIG	$180	$0.04	.

Table 10 - AT&T's Business Monthly Subscription Rate per Download Speed in Mbps[31]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
AT&T Fixed Wireless Internet for Business[32]	Fixed Wireless	25 Mbps	$60	$2.40	Includes 350GB of data per month. $10 for each add'l 50GB (up to $200/mo.)
AT&T Internet - Enterprise[24]	DSL	1 Gbps	Price varies with term	--	Best for 11 locations or more, single contract
AT&T Business Fiber Plan - Internet 300	Fiber	300 Mbps	$65	$0.22	
AT&T Business Fiber Plan - Internet 500	Fiber	500 Mbps	$95	$0.19	
AT&T Business Fiber Plan - Internet 1000	Fiber	940 Mbps	$160	$0.17	
AT&T Business Fiber Plan – 2 GIG	Fiber	2GIG	$225	$0.11	

[31] https://www.business.att.com/products/business-fiber-internet.html
[32] https://www.business.att.com/products/fixed-wireless-internet-for-business.html
[24] https://www.business.att.com/products/high-speed-internet.html

Package	Type of Connection	Download Speed[29]	MRC[24]	MRC per Mbps[25]	Notes
AT&T Business Fiber Plan –5 GIG	Fiber	5GIG	$395	$0.08	

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[33]. The market research performed by Magellan shows that T-Mobile 5G Home Internet has an average of 40% availability in Seminole County.

Table 11 - AT&T's Residential Monthly Subscription Rate per Download Speed in Mbps[34]

Package	Type of Connection	Download Speed[29]	MRC[24]	MRC per Mbps[25]	Notes
5G Home Internet	Fixed Wireless	182 Mbps	$50	$0.27	Unlimited Data, No Annual Contract

Crown Castle offers fiber optic service networks to businesses in the 42 states of the country. It reports to have the greatest coverage in New York, California, and Florida.[35] The market research performed by Magellan shows that its service offerings are 6% available to Seminole County businesses, wherein coverages in different neighborhoods could vary between 0% to 28%.

Florida High Speed Internet offers Fixed Wireless and Fiber services around the state of Florida. The market research performed by Magellan shows that its service offerings are 100% available to Seminole County business and government customers.

Table 12 - Florida High Speed Internet Business Monthly Subscription Rate per Download Speed in Mbps[36]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
FLHSI Fiber Business 50	Fiber	50 Mbps	$155	$3.10	Unlimited Data, Back up 100 GB of data in about 30 minutes
FLHSI Fiber Business 100	Fiber	100 Mbps	$250	$2.50	Unlimited Data, Back up 100 GB of data in about 10 minutes
FLHSI Fiber Business 500	Fiber	500 Mbps	$1,100	$2.20	Unlimited Data, Back up 100 GB of data in about 4 minutes

Wide Open West (WOW!) or provides copper, cable, and DSL internet to 9 states in the United States and is not currently available in Seminole County but has plans on entering the market. Most of their services with these types of connection are quickly being replaced by its hybrid fiber coaxial (HFC) service. This allows for faster download speeds ranging from 100 Mbps to 1 Gbps. Another beneficial feature WOW! plans to offer their customers in Seminole is not having to sign a contract to access their services. The list of potential service offerings for Seminole County are shown in the table below.

From WOW!'s recent public announcement in May of 2022[37], they have shared during an interview with Magellan that they are spending $400 million to deliver fiber to 400,000 new locations targeting its completion by 2027. This greenfield build initiative of the company includes Seminole County.

Table 13 - WOW! 's Residential Monthly Subscription Rate per Download Speed in Mbps[38]

Package	Type of Connection	Download Speed[23]	MRC[24]	MRC per Mbps[25]	Notes
Internet 100	Cable	100 Mbps	$39.99	$0.40	N/A
Internet 200	Cable	200 Mbps	$44.99	$0.22	N/A
Internet 500	Fiber	500 Mbps	$54.99	$0.11	N/A
Internet 1 Gig	Fiber	1 Gbps	$74.99	$0.07	N/A

[36] https://flhsi.com/services/fiber
[37] https://www.fiercetelecom.com/broadband/wow-doubles-its-fiber-expansion-target-400k-locations
[38] https://www.wowway.com/internet/florida/pinellas - the closest WOW! service area to Seminole County

Market Research Key Findings

- According to the FCC map, each household has more than one provider options but the higher the speed, the less or no provider is available to serve these areas around Seminole County. Example, areas in Altamonte Springs, Casselberry, Longwood, and Geneva have only one to no providers that reported a 100/10 Mbps service offering.
- The major internet service providers for residential customers in Seminole County are Spectrum, Viasat Internet and HughesNet with 100% reported availabilities around the County.
- Spectrum 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 Seminole County are Spectrum and Florida High Speed Internet.
- The top two widely available type of connections for residential customers are satellite 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 ranges from $0.04 (Fiber Optic) to $6.00 (Fixed Wireless) per Mbps.
- New market entrants including Summit Broadband and WoW have announced expansions into Seminole County and have expressed interest in continuing discussions with the county.

STAKEHOLDER OUTREACH OVERVIEW

Fast, economical, reliable internet access is essential for participation in today's digital economy. Seminole County's Broadband Study is aimed to understand the true connectivity gaps and needs across Seminole's communities that limit the ability of businesses and residents in the region to thrive. Magellan Advisors engaged stakeholder representatives from eleven different entities 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 Seminole County's broadband project, information on the standard baseline residential connectivity speeds as defined by the FCC[39], questions on Seminole county residents' connectivity with regards to their accessibility, reliability, and

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

affordability, and finally a map depicting the at-risk populations around the county was shown for stakeholders' verification.

Stakeholder Outreach Key Findings

The stakeholders that Magellan have engaged with, represent a wide cross section of Seminole County. This section will highlight the top connectivity issues impacting the County.

- There is an increasing **digital divide** among the citizens of Seminole County.
  - People who are left in the divide are mostly found in the rural parts of the County and those identified to be in low-income households.
  - Areas of concerns that were mentioned several times by different stakeholders are parts of Sanford, Longwood, Geneva and Southeast part of the County, and Altamonte Springs.
- There are plenty of resources and even devices that are available for the County citizens use such as laptops, Chromebooks distributed to students in need, and other mobile devices, but cannot be utilized or maximized due to the **lack of connectivity.** This leads to the waste of resources and lost opportunities.
- There is an **increasing demand for additional bandwidth** among the residents and businesses, and this trend is seen to go beyond a mere response to the pandemic.
  - Every stakeholder is integrating more advanced communications technologies in terms of how they conduct their meetings, trainings, day-today and critical operations, and communication with their patrons.
  - The leaders of these industries are not able to move forward without addressing their patrons' connectivity issues.

This section summarizes the discussions Magellan Advisors had with key stakeholders in Seminole County.

(a) County Leaders

i. Fire Department

The County's broadband project team met with the Seminole County's Fire Department leaders. They described that their department's connectivity is highly reliable with 20 of their stations connected to County fiber.

However, they see a growing need for better wireless connectivity for residents to be able to reach them in case of emergency from anywhere within the County. They also mentioned the challenges they are having with communicating safety notices or alerts, answering questions from the residents, especially those who are in the rural or underserved areas, which then leads to increased

departmental staff needs, thus impacting their budget. Another issue with unreliable communications is an increase in the aging population who are dependent on wearable health devices. The Chief of the department confirms that there are underserved communities in the area where he lives which is in the extreme Southeast of the County.

ii. Library

The project team also met with the County's Library Service's Division Manager, who oversees the five library branches around the County. All the libraries have public desktop computers and Sanford has the highest computer usage among the library locations. The five libraries also offer public Wi-Fi outside their buildings so that the residents can access it any time. However, the library at Wekiva location does not have the capacity to provide a reliable connection to its residents. She shared her concern for the residents around Sanford, Altamonte Springs, and Apopka for not having reliable broadband access and not having the devices for some. The Library manager herself has unreliable access to broadband. During the Covid-19 pandemic, the libraries were not able to provide Mi-Fi devices to the residents in need due to budget constraints. This hinders them from working on their *Digital Inclusion* initiatives.

iii. Leisure Services

From the County's Leisure Services department's Director. He observed that there is a high concentration of people in sports complexes. He is aware that there is Fiber available around these sites, but it may not have the capacity to support the crowds.

He mentioned the extremely limited access to public Wi-Fi around the County. He mentioned that Longwood has very bad broadband connections and that their security cameras around the city barely work. He would like to find out if it is possible to use parks located in low to moderate income populated areas to supply Public Wi-Fi access.

(b) City Leaders

i. City of Longwood

The project team spoke with the City's director of I.T. where he shared about the availability of Lumen and Spectrum. There are currently no public Wi-Fis being offered for the citizens but they have a robust broadband connection within the City buildings which enables them to perform their operational tasks efficiently. The I.T. personnel however raised a concern on several at-risk populations in the neighboring areas such as Chuluota, Geneva and the east portion of then Ronald Reagan Boulevard.

ii. City of Oviedo

The project team spoke with the City's Director of I.T. and Assistant City Manager. The I.T. director shared that their team noticed slowdowns with the City's connectivity during the pandemic due to network congestion. They currently have Spectrum as their provider.

According to the Assistant City Manager, the City is currently not offering public Wi-Fis. Connectivity issues were raised during one of Oviedo Actions meetings, specifically by the citizens coming from low income or as they consider as "unserved" areas .

They City's team also shared that one of the major goals in the near future with regards to Economic Development is to provide a better broadband infrastructure for the businesses that are coming in the City including a mall that is to be constructed.

(c) Education Industry

i. Seminole State College of Florida

The project team spoke with, the Vice President of I.T. and Resources, who is also with the Chief Information Officer for Seminole State College of Florida. He shared that there are four campus locations around the County – Altamonte Springs, Heathrow, Oviedo, and Sanford/Lake Mary. Their school sites use the County's dark fiber from its traffic network. Their network spans 200 miles of fiber connecting its campuses which delivers 3GB Internet circuits shared between all sites which is expected to be upgraded to 5GB by September of 2022. The challenge that he and his team has observed is the growing demands of students for reliable and affordable broadband access. 50% of their students are on financial aid.

Their libraries lend out laptops and provide connectivity through T-Mobile's 5G service, AT&T, and recently COX also came in to provide service. The library uses their mesh network to extend their buildings' connectivity to their parking lots where students are able to perform academic tasks that require digital access such as accessing Microsoft applications and student learning management portals. He mentioned that the download speeds by Spectrum are fine, but it is the upload that does not work for most students, and that they would rather connect through their mobile phone's cellular network than use the campuses' Wi-Fi.

They have distributed over 1000 devices/computers to minority and low-income groups during the Covid-19 Pandemic. In line with the device distribution, they have also partnered with T-Mobile for their 5G cards and with Spectrum which was only able to provide a maximum of 10 Mbps download speeds which CIO describes as extremely poor connectivity.

Another issue that the department's CIO describes is the misleading advertised offerings of the major Internet Service Providers (ISPs). They are promised download speeds of 200 Mbps, but for an instance AT&T only has offered a 10 Mbps symmetrical service. They offload AT&T data from their fiber network and charge them. Recently, AT&T offered Hotspot 2.0 that supplies Wi-Fi that allocates 500MB just to allow students to access important notifications such as the weather or safety alerts.

He has identified the following areas that to do not have access to broadband:

- Geneva
- Sanford
- Oxford

- Altamonte Springs
- Other locations with school sites

ii.   Foundation for Seminole State College of Florida, Inc.

The project team has spoken with the Vice President of Resource and Economic Development. He shared that their campuses distributed hot spots to students who cannot afford them. He mentioned that their top priorities for their students are food and shelter.

iii.   Seminole County Public Schools (SCPS)

From SCPS, the project team was able to get insights from the organization's Chief Technology Officer, Supervisor of Information Systems Operations, Network Engineer Architect, and Manager, I.S. Security Engineer.

SCPS team mentioned that Geneva has limited broadband service offerings available to its residents. To support the students in keeping up with hybrid learning and digitally dependent academic activities, SCPS have distributed almost 17,000 Chromebook devices to students who are not able to afford them. In terms of connectivity, SCPS partnered with Spectrum and directed families to its programs, and as well as T-Mobile for the schools' Mi-Fi devices. The SCPS team has been implementing several wireless network upgrades which helped in spreading the parameters of connectivity for students to access. They also mentioned using the County's fiber often and expressed the need for upgrading their fiber ring as the demand for bandwidth continues to increase in parallel with increases in other activities such as video conferencing.

(d) Health Industry

i.   Florida Department of Health in Seminole County

The project team has spoken with Florida Department of Health's Health Officer Administrator -, Assistant Administrator and Regional I.T. Director.

The department's Office Administrator shared that there is little to no coverage in rural areas around the County. This has been a challenge for the residents in the said areas as the department pursues the expansion of Telehealth in order to take advantage of new Health Programs. In relation to this issue, a major threat to the County is the widening gap among its citizens access to broadband connectivity.

The Assistant Administrator confirmed that there are connectivity gaps within the County. In addition, she mentioned that there are shortages of laptops and other necessary equipment to get connected, especially in the underserved areas. This issue is in contradiction to one of their department's goals which is to enhance telemedicine within the community.

The Regional I.T. Director shared a challenging experience especially during the pandemic in allowing their healthcare professionals to communicate to patients that need critical and real time observations. His team has provided "jet paks" or Mi-Fi devices to their staff through Verizon so that they were able to continue to reach their patients who have access to broadband. It is important for

them to offer telehealth conferences as there are patients who are more reluctant to visit the hospital. He mentioned that their team is fully supportive of any method to bring better network coverage across the County to support their staff and their patients.

ii. AdventHealth

The project team has spoken with AdventHealth Altamonte Springs CEO and Government Relations Manager. They mentioned that most people that they serve come from the following areas which follow a socioeconomic demographics:

- East Altamonte Springs
- Sanford
- Casselberry
- Longwood

The CEO stated that devices and broadband connection are critical components to bringing improved health care to everyone. Affordable virtual access is also critical to their business as it helps alleviate the shortage in workers. He also shared that - by the end of the year, AdventHealth will be on *Epic Platform* which will provide a lot of integration that will require both a device and reliable connectivity.

The CEO mentioned that there are numerous web-based telehealth tools available but are unfortunately inaccessible to many County citizens due to connectivity constraints. They see that the critical application of telehealth would be to act as a preventive method through early diagnoses, keeping more people out of the hospital which also means healthier citizens. Their team views better broadband infrastructure in the County, to help the communities that they serve and would support their organization's initiatives on telehealth and overall cost-effectiveness.

(e) Economic Development And Workforce Group

i. Sanford Chamber of Commerce

The project team has spoken with Sanford's Chamber of Commerce's President.

Since the pandemic she has seen a dramatic decline in the number of her members and activity participations due to the lack of connectivity among the members around the County. Despite the more efficient methods such as video conferencing, The organization's president had to go out in the communities to reach out to businesses and extend her support. She specifically mentioned several low-income areas in Sanford that need attention. With the hope of moving forward and reaching out regularly to the members, she would like to conduct "Online Luncheons" or "Meet and Greet" but is still hesitant due to the connectivity issues for many. To conclude, she mentioned that there are a lot of opportunities and resource available, unfortunately many businesses are not able to access them.

(f) Other Influential County Stakeholders

The County's project team met with several key industry leaders such as Duda & Son's Sr. Purchasing Manager, Corporate Facilities, Sustainable Agriculture & Food Systems Extension's Agent, and Seminole's Affordable Housing Committee's Vice Chairman.

ii.   *Duda & Sons*

iii.   *Sustainable Agriculture & Food Systems Extension*

The Vice Chair from the Affordable Housing Committee stated that he has seen a significant broadband issue in many of the communities around the County, specifically from the housings' point of view. He shared that even the new apartment complexes that have been and are being built continuously have terrible broadband quality. In addition, he shared that during the pandemic, although the County provided devices such as laptop for students from low-income households, these families continued to be challenged by the lack of affordable broadband service options. In short, they had the devices but are not equipped enough due to the lack or absence of reliable connectivity.

iv.   *Seminole's Affordable Housing Committee*

The Committees' Agent works with farmers towards sustainability and is offering trainings with her team. Her team purchased a number of software licenses in order to offer online training but many of the students had connectivity issues like dropped calls in Zoom. This hindered the students from attending and earning their credits, pushing them to retake the course. Another issue is that the students are not able to troubleshoot connectivity issues on their own and this demands more time and effort from Morgan's team.

SURVEY SUMMARY AND DETAILS

Magellan Advisors created a broadband survey for residents and businesses in Seminole. The County's project team dispersed paper surveys and online surveys through a variety of means (i.e., social media, chamber events, County website). The survey resulted in 1,789 responses, 1,346 of which were complete surveys. These survey responses were distributed 96% residents and 4% businesses. The goals of the survey were to determine broadband availability, pricing, and service satisfaction among the citizens and businesses in Seminole.

Survey Key Findings

- **Spectrum** is the dominant provider among respondents from the County.
- Seminole's citizens have broadband services available to them but consider them mostly **unreliable**, **nor cost effective**.
  - Almost half of the respondents reported of having **frequent connection slowdowns** within a month.
  - Over half of the respondents reported having **frequent connection outages** within a month.
  - **Cable** is the most common type of broadband connection in every area of the County.
- Residential respondents' frequent use of broadband is mostly for **personal research**, **telehealth,** school and for **telecommute or work from home activities.**
- Internet providers' **price** offerings is the greatest source of dissatisfaction among the residents and business respondents.

Below are the map of the survey participants and summary of the survey results by Speed Test Result:

Figure 23 - Magellan's Survey Data Map by Download Speeds in Mbps
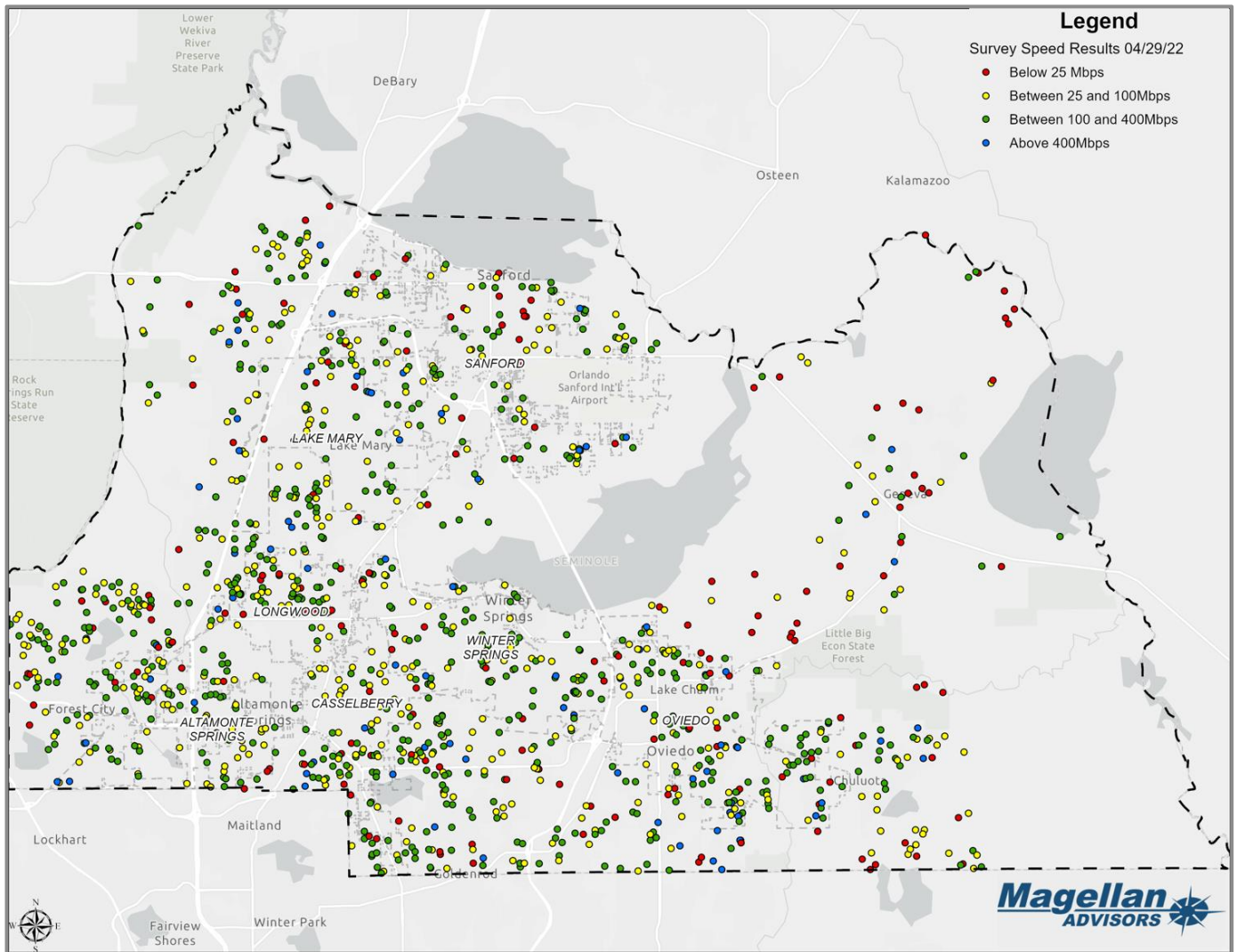
Figure 24 - Magellan's Survey Data Map by Download Speeds in Mbps: Unserved and Underserved

Figure 25 - Seminole County Broadband Survey Infographics

Figure 25 - Seminole County Broadband Survey Infographics

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.

Table 14 - 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 26 - Speed Associated with Internet Technologies

4G LTE cellular
- Typically, about 6 Mbps
- Up to 30 Mbps
- Varies greatly with signal
- Data caps typical

Digital Subscriber Line (DSL)
- Twisted pair copper wires
- Typically, about 10 Mbps but often much less
- Nominally, up to 45 Mbps
- Shared bandwidth

Data Over Cable (DOCSIS)
- Coaxial copper cable
- Typically, about 150 Mbps
- Nominally, Up to 1 Gbps
- Shared bandwidth

Fiber Optics
- 1 Gbps and faster
- Active Ethernet or Passive Optical
- Dedicated or shared bandwidth

While the overwhelming infrastructure across Seminole 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 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 Seminole 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 Seminole 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 Broadband Opportunity Program are other key funding sources being utilized across Florida at this moment.

Figure 27 - Florida Funding Options for Broadband and Grant Summary
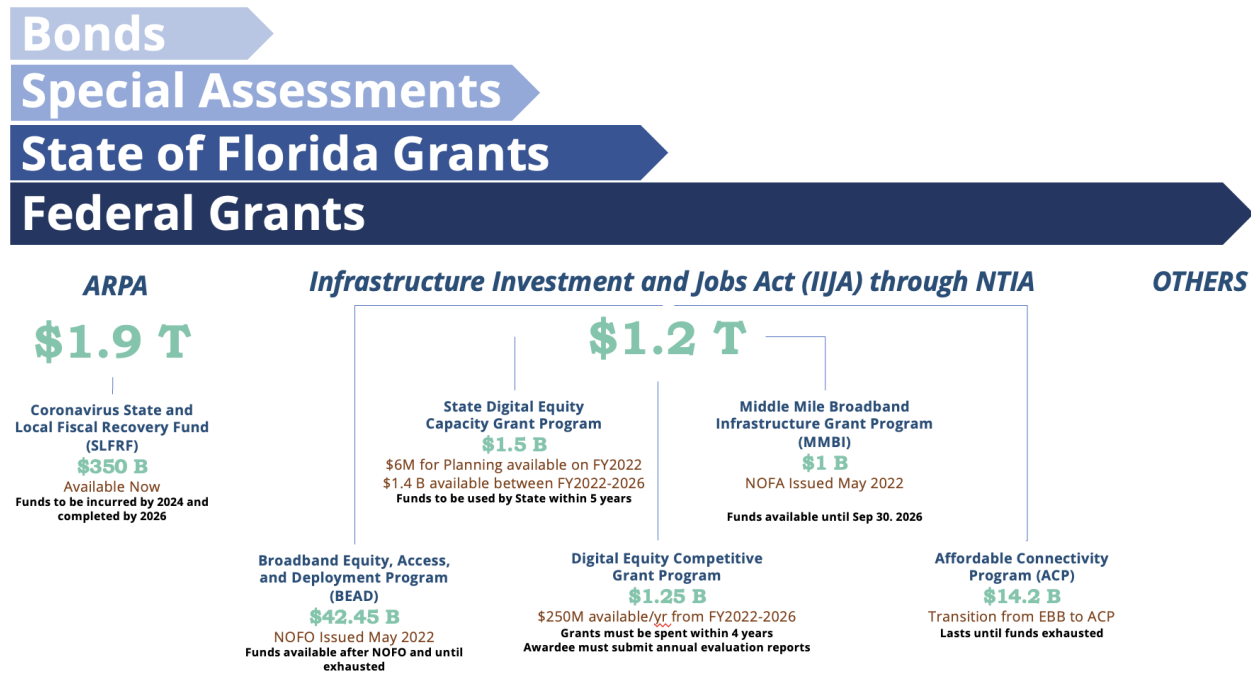
The Broadband Opportunity Program is contained in the Florida Broadband Deployment Act of 2021 (HB 1239), which passed unanimously in both House and Senate and became effective July 1, 2021. The Broadband Opportunity Fund grant funding is provided for infrastructure deployments to expand service to unserved 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."[40] In practice, these latter provisions are subject to interpretation and increase the likelihood that grants will be challenged by incumbent providers.

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[40] F.S. 288.9962 (2).

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."[41]
- For a "project area for which any other federal funding has been awarded". [42]
- Which fund greater than 50% of the total cost of a project.[43]
- In amounts in excess of $5 million.[44]

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 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

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[41] F.S. 288.9962 (4).
[42] F.S. 288.9962 (8)(a).
[43] F.S. 288.9962 (8)(c).
[44] F.S. 288.9962 (8)(d).

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.

Appendix 1: Tower Sites List

City Owned Towers					
Tower Owner	**Height**	**Street**	**Community**	**Latitude**	**Longitude**
SEMINOLE COUNTY SHERIFFS OFFICE	100	BUSH LOOP	SANFORD	28.7459	-81.3003532
SEMINOLE COUNTY PUBLIC SCHOOLS	100	E SR 434	WINTER SPRINGS	28.70665	-81.2898523
SEMINOLE COUNTY	220	TROPICAL AVE	CHULUOTA	28.63248	-81.1251638
SEMINOLE COUNTY	250	DIKE RD	WINTER PARK	28.63887	-81.282891
SEMINOLE COUNTY	280	BUSH LOOP	SANFORD	28.7433	-81.3006904
SEMINOLE COUNTY	180	2ND ST	GENEVA	28.73658	-81.1168691
SEMINOLE COUNTY	300	E OSCEOLA RD	GENEVA	28.78505	-81.08452
SEMINOLE COUNTY	170	WAYSIDE DR	PAOLA	28.81086	-81.340542
SEMINOLE COUNTY	180	WEKIVA SPRINGS RD	LONGWOOD	28.70188	-81.4176231
SEMINOLE COUNTY	300	YANKEE LAKE RD	SANFORD	28.81766	-81.40044
Commercial Towers					
Tower Owner	**Height**	**Street**	**Community**	**Latitude**	**Longitude**
UNKNOWN	0	N RONALD REAGAN BLVD	LONGWOOD	28.73106	-81.3307791
UNKNOWN	0	WYMORE RD	ALTAMONTE SPRINGS	28.65996	-81.3901984
CROWN CASTLE CORPORATION	180	SANLANDO RD	ALTAMONTE SPRINGS	28.68432	-81.4146839
GLOBAL TOWER PARTNERS	150	CANDACE DR	MAITLAND	28.64461	-81.3561484
CITY OF OVIEDO	250	ALEXANDRIA BLVD	OVIEDO	28.65359	-81.2013614
AT&T WIRELESS	122	SR 436	WINTER PARK	28.62369	-81.3131111
AMERICAN TOWER CORP	130	N SUN DR	LAKE MARY	28.75823	-81.3537514

T-MOBILE USA, INC	164	LOWE AVE	SANFORD	28.7945	-81.326769
CROWN CASTLE CORPORATION	147	EE WILLIAMSON RD	LONGWOOD	28.71125	-81.38004
AT&T MOBILITY	0	S WINTER PARK DR	CASSELBERRY	28.64988	-81.3220974
CROWN CASTLE CORPORATION	0	SKYLINE DR	LAKE MARY	28.73422	-81.3656865
TOWER CO	177	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66714	-81.368744
AT&T MOBILITY	0	NORTHLAKE BLVD	ALTAMONTE SPRINGS	28.65389	-81.3875
AT&T MOBILITY	95	W SR 436	ALTAMONTE SPRINGS	28.66419	-81.413989
CROWN CASTLE CORPORATION	180	LAKE HOWELL RD	WINTER PARK	28.62299	-81.325139
CROWN CASTLE CORPORATION	121	S RONALD REAGAN BLVD	ALTAMONTE SPRINGS	28.67805	-81.34972
AT&T MOBILITY	202	SR 436	CASSELBERRY	28.64028	-81.3239585
CROWN CASTLE SOUTH LLC	272	NARCISSUS AV	SANFORD	28.81522	-81.3048581
CROWN CASTLE CORPORATION	182	ORANGE BLVD	SANFORD	28.81885	-81.3611999
T-MOBILE USA	0	RINEHART RD	SANFORD	28.79547	-81.342913
FLORIDA POWER CORPORATION	0	WEKIVA SPRINGS RD	LONGWOOD	28.70172	-81.418089
CROWN CASTLE CORPORATION	230	OLD SANFORD OVIEDO RD	WINTER SPRINGS	28.7075	-81.30388
CROWN CASTLE CORPORATION	104	W LAKE MARY BLVD	LAKE MARY	28.7551	-81.3301
AMERICAN TOWER CORP	485	LONGWOOD HILLS RD	LONGWOOD	28.71363	-81.343138
RHEA & ASSOCIATES CORPORATION	266	HICKMAN DR	SANFORD	28.81678	-81.331724
VERIZON WIRELESS	0	E BROADWAY ST	OVIEDO	28.67236	-81.188062

VERIZON WIRELESS	0	WALLACE CT	LAKE MARY	28.77312	-81.351095
VERIZON WIRELESS	0	W 1ST ST	SANFORD	28.81199	-81.270498
T-MOBILE USA, INC	136	ANCHOR RD	CASSELBERRY	28.66737	-81.344626
T-MOBILE USA, INC.	141	RICHMOND AVE	SANFORD	28.77465	-81.202827
GLOBAL TOWER PARTNERS	200	SUNSET LN	OVIEDO	28.63987	-81.268182
T-MOBILE USA, INC	0	BRANTLEY HILLS CT	LONGWOOD	28.6893	-81.436865
TOWER CO	181	S SR 434	ALTAMONTE SPRINGS	28.65426	-81.417303
T-MOBILE USA, INC.	0	SKYLINE DR	LAKE MARY	28.73327	-81.368591
AMERICAN TOWER CORP	0	CONNECTION PT	OVIEDO	28.63376	-81.238633
CROWN CASTLE CORPORATION	294	W SR 46	GENEVA	28.74922	-81.133954
T-MOBILE USA, INC	0	TALON PL	OVIEDO	28.69106	-81.2206
T-MOBILE USA, INC	200	AVENUE C	CHULUOTA	28.64026	-81.128353
CROWN CASTLE CORPORATION	102	FERNWOOD BLVD	FERN PARK	28.65583	-81.34222
AMERICAN TOWER CORP	0	MACASPHALT PL	WINTER SPRINGS	28.71256	-81.306787
AMERICAN TOWER CORP	0	N RONALD REAGAN BLVD	SANFORD	28.74246	-81.289857
UNKNOWN	180	BELLE AVE	WINTER SPRINGS	28.69607	-81.316027
AMERICAN TOWER CORP	125	LINCOLNWOOD LN	LONGWOOD	28.71455	-81.361752
T-MOBILE SOUTH, LLC	174	E SR 434	WINTER SPRINGS	28.70236	-81.266698
UNKNOWN	0	TRUMPET LEAF PT	OVIEDO	28.69365	-81.212872
AMERICAN TOWER CORP	221	WILLINGHAM RD	CHULUOTA	28.65956	-81.167767

AMERICAN TOWER CORP	180	WILLINGHAM RD	CHULUOTA	28.65956	-81.167767
CROWN CASTLE CORPORATION	185	MINGO TRL	LONGWOOD	28.69713	-81.357641
AMERICAN TOWER	179	CENTRAL PARK DR	SANFORD	28.80551	-81.318434
T-MOBILE USA, INC.	0	DOCKSIDE ST	WINTER PARK	28.61894	-81.283771
SBA COMMUNICATIONS CORP	240	ALBRIGHT RD	SANFORD	28.79916	-81.300644
T-MOBILE USA, INC	0	S SR 434	ALTAMONTE SPRINGS	28.65657	-81.411733
PT ACCESS	0	E SR 436	APOPKA	28.67249	-81.45595
VERIZON WIRELESS	120	SEMINOLA BLVD	CASSELBERRY	28.6753	-81.31252
	0	GARDEN LAKE BLVD	WINTER PARK	28.63448	-81.284508
AT&T MOBILITY	195	CASSELTON DR	WINTER PARK	28.6172	-81.310319
	469	CHARLES ST	LONGWOOD	28.68934	-81.349121
	0	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66235	-81.360849
CROWN CASTLE CORPORATION	400	BAY MEADOW RD	LONGWOOD	28.72221	-81.344222
T-MOBILE USA	0	CANNON WAY	CASSELBERRY	28.6501	-81.326536
AMERICAN TOWER CORP	152	E SR 46	GENEVA	28.71794	-81.065006
K2 TOWERS LLC	151	N BEARDALL AV	SANFORD	28.79835	-81.220095
	0	STATION ST	OVIEDO	28.66871	-81.207441
TIMOTHY J BENNETT	115	MAGNOLIA AV	SANFORD	28.77781	-81.266834
	291	PRATT PL	OVIEDO	28.6592	-81.2271
	147	IRON BRIDGE CIR	OVIEDO	28.62295	-81.217622
CROWN CASTLE CORPORATION	167	W PINEVIEW ST	ALTAMONTE SPRINGS	28.68027	-81.389459

VERIZON WIRELESS	0	ORLANDO DR	SANFORD	28.77107	-81.276191
VERIZON WIRELESS	0	LONGWOOD LAKE MARY RD	LONGWOOD	28.73199	-81.332885
VERIZON WIRELESS	0	BEASLEY RD	OVIEDO	28.63463	-81.203481
CROWN CASTLE SOUTH LLC	152	ORLANDO DR	SANFORD	28.7554	-81.285712
UNKNOWN	0	SKYLINE DR	LAKE MARY	28.73765	-81.368797
UNKNOWN	0	SKYLINE DR	LAKE MARY	28.73846	-81.3687714
UNKNOWN	0	RINEHART RD	LAKE MARY	28.77187	-81.3517322
CROWN CASTLE CORPORATION	394	PINEDA ST	LONGWOOD	28.68643	-81.3497223
HARRIS CORPORATION	370	IRON BRIDGE CIR	OVIEDO	28.62027	-81.2204842
SBA COMMUNICATIONS CORP	250	SNOW HILL RD	GENEVA	28.69724	-81.1139901
VERIZON WIRELESS	0	E HILLCREST ST	ALTAMONTE SPRINGS	28.67596	-81.3866715
VERIZON WIRELESS	0	E LAKE DR	WINTER SPRINGS	28.6634	-81.2854282
FLORIDA POWER CORPORATION	0	SKYLINE DR	LAKE MARY	28.73269	-81.3687869
SALEM MEDIA	234	RECYCLING PT	LONGWOOD	28.69414	-81.3488938
T-MOBILE USA, INC	140	W AIRPORT BLVD	SANFORD	28.77818	-81.296873
TOWER CO	100	BEAR LAKE RD	APOPKA	28.65019	-81.442719
T-MOBILE USA, INC	0	TUSCA TRL	WINTER SPRINGS	28.67064	-81.285529
CROWN CASTLE CORPORATION	133	ALAQUA LAKES BLVD	LONGWOOD	28.7584	-81.38279
GLOBAL TOWER PARTNERS	150	WINTER SPRINGS BLVD	WINTER SPRINGS	28.67329	-81.255404
	0	SR 419	LONGWOOD	28.72636	-81.30876
T-MOBILE USA, INC.	140	CAMERON AVE	SANFORD	28.78798	-81.214656

SBA COMMUNICATIONS CORP	131	E MCCULLOCH RD	OVIEDO	28.61298	-81.190466
J & V COMMUNICATIONS INC DBA = WTRR AM	247	CELERY AVE	SANFORD	28.80219	-81.250137
UNKNOWN	0	SEMINOLE SOCCER LOOP	SANFORD	28.79465	81.387375
TOWER CO	125	W SR 434	LONGWOOD	28.69644	-81.368208
CITY OF LONGWOOD	0	MYRTLE ST	LONGWOOD	28.70063	-81.34453
SBA COMMUNICATIONS CORP	177	MYSTIC LAKE DR	OVIEDO	28.62333	-81.255
GLOBAL TOWER PARTNERS	120	SEMINOLA BLVD	CASSELBERRY	28.6754	-81.313932
CCATT LLC	178	W 14TH ST	SANFORD	28.79909	-81.27233
CROWN CASTLE CORPORATION	182	DALHAUSSER LN	OVIEDO	28.61916	-81.20666
AT&T MOBILITY	164	SHORE RD	WINTER SPRINGS	28.68871	-81.28214
AT&T MOBILITY	150	2ND ST	MAITLAND	28.64111	-81.35694
T-MOBILE USA, INC.	0	HOWELL BRANCH RD	WINTER PARK	28.62271	-81.298767
AT&T MOBILITY	0	E 29TH ST	SANFORD	28.77583	-81.255278
UNKNOWN	0	W SR 436	ALTAMONTE SPRINGS	28.66308	-81.391468
AMERICAN TOWER CORP	0	ORANGE BLVD	SANFORD	28.8315	-81.330935
PT ACCESS	0	GRAND RD	WINTER PARK	28.62623	-81.286438
PT ACCESS	0	OLD LOCKWOOD RD	OVIEDO	28.61297	-81.174659
VERIZON WIRELESS	0	E SR 436	APOPKA	28.67243	-81.455791
AT&T MOBILITY	0	GLENWOOD DR	LAKE MARY	28.44381	-81.20478
GLOBAL TOWER PARTNERS	11	W SR 434	LONGWOOD	28.6883	-81.3931

FL POWER CORP	0	BEASLEY RD	OVIEDO	28.6369	-81.203308
CROWN CASTLE CORPORATION	0	MARKHAM WOODS RD	LAKE MARY	28.77761	-81.384738
T-MOBILE USA, INC.	0	MARKHAM WOODS RD	LAKE MARY	28.77761	-81.384738
UNKNOWN	125	KELLER RD	ALTAMONTE SPRINGS	28.64239	-81.399149
T-MOBILE USA, INC.	140	HISTORIC GOLDSBORO BLVD	SANFORD	28.80073	-81.274193
AMERICAN TOWER CORP	0	SELF ESTEEM WAY	APOPKA	28.66933	-81.433624
SEMINOLE COUNTY SHERIFFS OFFICE	100	BUSH LOOP	SANFORD	28.7459	-81.3003532
SEMINOLE COUNTY PUBLIC SCHOOLS	100	E SR 434	WINTER SPRINGS	28.70665	-81.2898523
CITY OF ALTAMONTE SPRINGS	180	NEWBURYPORT AVE	ALTAMONTE SPRINGS	28.66369	-81.3591117
SEMINOLE COUNTY	220	TROPICAL AVE	CHULUOTA	28.63248	-81.1251638
SEMINOLE COUNTY (NEW CONSTRUCTED TOWER)	250	DIKE RD	WINTER PARK	28.63887	-81.282891
SEMINOLE COUNTY	280	BUSH LOOP	SANFORD	28.7433	-81.3006904
CITY OF ALTAMONTE SPRINGS	160	CALABRIA DR	ALTAMONTE SPRINGS	28.66926	-81.422696
SEMINOLE COUNTY	180	2ND ST	GENEVA	28.73658	-81.1168691
SEMINOLE COUNTY	300	E OSCEOLA RD	GENEVA	28.78505	-81.08452
SEMINOLE COUNTY	170	WAYSIDE DR	PAOLA	28.81086	-81.340542
SEMINOLE COUNTY (NEW CONSTRUCTED TOWER)	180	WEKIVA SPRINGS RD	LONGWOOD	28.70188	-81.4176231
SEMINOLE COUNTY	300	YANKEE LAKE RD	SANFORD	28.81766	-81.40044

UNKNOWN	0	INSPIRATION AVE	ALTAMONTE SPRINGS	28.64165	-81.41184
VERIZON	0	HUNTERFIELD RD	MAITLAND	28.64344	-81.3409245
UNKNOWN	0	INTERNATIONAL PKWY STE 200	SANFORD	28.76445	-81.36191
CROWN CASTLE TOWERS 06-2 LLC	235	ORANGE BLVD	SANFORD	28.79739	-81.3624153
AT&T MOBILITY	60	GREENWOOD BLVD	LAKE MARY	28.74374	-81.3643487
	0	MARKHAM WOODS RD	LONGWOOD	28.69855	-81.3865808
T-MOBILE USA, INC.	0	E LAKE DR	WINTER SPRINGS	28.66226	-81.2838222
AT&T MOBILITY	0	INTERNATIONAL PKWY	LAKE MARY	28.77808	-81.356346
AT&T MOBILITY	0	COMMERCE PARK DR	LONGWOOD	28.69071	-81.390886
APC TOWERS LLC	110	TRINITY WOODS LN	MAITLAND	28.64223	-81.3872533
AT&T MOBILITY	0	AAA DR	LAKE MARY	28.76953	-81.36227
VERIZON WIRELESS	0	HEATHROW PARK LN	LAKE MARY	28.78022	-81.356014
VERIZON WIRELESS	0	CRANES ROOST BLVD	ALTAMONTE SPRINGS	28.66349	-81.384084
VERIZON WIRELESS	0	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66283	-81.382275
VERIZON WIRELESS	0	CRANES ROOST BLVD	ALTAMONTE SPRINGS	28.66593	-81.38362
T-MOBILE USA, INC	0	EE WILLIAMSON RD	LONGWOOD	28.7122	-81.3668
VERIZON WIRELESS	0	S SR 434	ALTAMONTE SPRINGS	28.6599	-81.421063
CROWN CASTLE SOUTH LLC	128	ORLANDO DR	SANFORD	28.74781	-81.291073
VERIZON	0	HEATHROW PARK LN	LAKE MARY	28.7819	-81.354597
AT&T MOBILITY	0	SEMINOLA BLVD	CASSELBERRY	28.68368	-81.333813
AT&T MOBILITY	0	RED BUG LAKE RD	WINTER SPRINGS	28.6483	-81.266965

AT&T MOBILITY	0	RED BUG LAKE RD	WINTER SPRINGS	28.6474	-81.269716
AT&T MOBILITY	0	TUSKAWILLA RD	OVIEDO	28.64554	-81.266252
AT&T MOBILITY	0	RED BUG LAKE RD	OVIEDO	28.65187	-81.242835
T-MOBILE USA, INC	0	BEAR LAKE RD	APOPKA	28.66506	-81.4454
VERTEX DEVELOPMENT LLC	0	LOCKWOOD BLVD	OVIEDO	28.62944	-81.1683333
T-MOBILE USA, INC.	0	WILSON RD	SANFORD	28.80085	-81.3444244
TARPON TOWERS	0	WEKIVA SPRINGS RD	LONGWOOD	28.70805	-81.44444
CROWN CASTLE CORPORATION	190	N CR 426	OVIEDO	28.68476	-81.161613
VERIZON WIRELESS	0	TOWNE CENTER BLVD	SANFORD	28.81085	-81.3341018
VERIZON WIRELESS	0	TOWNE CENTER BLVD	SANFORD	28.8071	-81.3352383
VERIZON WIRELESS	0	TOWNE CENTER BLVD	SANFORD	28.80373	-81.3352953
VERIZON WIRELESS	0	TOWNE CENTER BLVD	SANFORD	28.79976	-81.339013
VERIZON WIRELESS	0	ST JOHNS PKWY	SANFORD	28.80535	-81.3316753
NEW CINGULAR WIRELESS PCS, LLC	0	ALOMA AVE	WINTER PARK	28.68865	-81.272012
VERIZON WIRELESS	0	OVIEDO MALL BLVD	OVIEDO	28.66452	-81.2344938
VERIZON WIRELESS	0	OVIEDO MALL BLVD	OVIEDO	28.66474	-81.2385799
VERIZON WIRELESS	0	OVIEDO MALL BLVD	OVIEDO	28.66092	-81.2384478
AT&T MOBILITY	0	W SR 46	SANFORD	28.81188	-81.322542
UNKNOWN	0	W 1ST ST	SANFORD	28.81182	-81.284629
AT&T MOBILITY	0	LOCKWOOD BLVD	OVIEDO	28.62439	-81.17988
AT&T MOBILITY	0	LOCKWOOD BLVD	OVIEDO	28.65949	-81.177957
AT&T MOBILITY	0	GENEVA DR	OVIEDO	28.67475	-81.203102

UNKNOWN	0	RED BUG LAKE RD	OVIEDO	28.65618	-81.237862
UNKNOWN	0	E MCCULLOCH RD	OVIEDO	28.61212	-81.19243
UNKNOWN	0	SEMINOLE AVE	OVIEDO	28.61224	-81.201182
UNKNOWN	0	W MCCULLOCH RD	OVIEDO	28.61193	-81.212814
AT&T MOBILITY	0	S HUNT CLUB BLVD	APOPKA	28.67346	-81.449204
UNKNOWN	0	W SR 426	OVIEDO	28.64134	-81.233468
UNKNOWN	0	SERENITY PL	LAKE MARY	28.74005	-81.334893
AT&T MOBILITY	0	E SR 434	LONGWOOD	28.69796	-81.338697
UNKNOWN	0	W SR 426	OVIEDO	28.646	-81.231611
UNKNOWN	0	W SR 426	OVIEDO	28.63662	-81.236172
UNKNOWN	0	GREENFORD DR	LAKE MARY	28.73872	-81.35141
AT&T MOBILITY	0	LINA LN	APOPKA	28.66245	-81.443738
VERIZON	0	RINEHART RD	SANFORD	28.80181	-81.331292
UNKNOWN	0	RINEHART RD	SANFORD	28.80802	-81.33132
UNKNOWN	0	RINEHART RD	SANFORD	28.79303	-81.339763
AT&T MOBILITY	0	S HUNT CLUB BLVD	APOPKA	28.66974	-81.450362
AT&T MOBILITY	0	SR 436	CASSELBERRY	28.63567	-81.320938
AT&T MOBILITY	0	S US HWY 17-92	CASSELBERRY	28.67949	-81.335418
AT&T MOBILITY	0	SR 436	CASSELBERRY	28.6329	-81.319656
AT&T MOBILITY	0	CRYSTAL DR	LAKE MARY	28.757	-81.338
ENSURE4	0	WEKIVA SPRINGS RD	LONGWOOD	28.689	-81.405
AT&T MOBILITY	0	N OREGON ST	SANFORD	28.81189	-81.341328
AT&T MOBILITY	0	W 27TH ST	SANFORD	28.77851	-81.274441
AT&T MOBILITY	0	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66599	-81.377216
AT&T MOBILITY	0	E LAKE MARY BLVD	SANFORD	28.76141	-81.263365

AT&T MOBILITY	0	DOUGLAS AVE	ALTAMONTE SPRINGS	28.66229	-81.390246
AT&T MOBILITY	0	W LAKE MARY BLVD	LAKE MARY	28.75585	-81.347318
AT&T MOBILITY	0	E CENTRAL PKWY	ALTAMONTE SPRINGS	28.6703	-81.384271
AT&T MOBILITY	0	INTERNATIONAL PKWY	LAKE MARY	28.78674	-81.357844
AT&T MOBILITY	0	N US HWY 17-92	LONGWOOD	28.70365	-81.327074
DUKE ENERGY	0	WEST TOWN PKWY	ALTAMONTE SPRINGS	28.65835	-81.41973
AT&T MOBILITY	0	RINEHART RD	SANFORD	28.80257	-81.3312886
AT&T MOBILITY	0	ORIENTA AVE	ALTAMONTE SPRINGS	28.66116	-81.358544
AT&T MOBILITY	0	GATEWAY DR	ALTAMONTE SPRINGS	28.6449	-81.417817
AT&T MOBILITY	0	LOTUS LANDING BLVD	ALTAMONTE SPRINGS	28.65049	-81.416728
AT&T MOBILITY	0	GATEWAY DR	ALTAMONTE SPRINGS	28.64463	-81.413234
AT&T MOBILITY	0	ESSEX DR	ALTAMONTE SPRINGS	28.66322	-81.378044
AT&T MOBILITY	0	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66332	-81.357505
VERIZON WIRELESS	0	JASMINE RD	ALTAMONTE SPRINGS	28.39047	-81.22012
VERIZON	0	RINEHART RD	SANFORD	28.79259	-81.341309
AT&T MOBILITY	0	S RONALD REAGAN BLVD	LONGWOOD	28.69018	-81.345833
UNKNOWN	0	S PEARL LAKE CSWY	ALTAMONTE SPRINGS	28.65487	-81.427063
AT&T MOBILITY	0	E AIRPORT BLVD	SANFORD	28.76904	-81.277097
AT&T MOBILITY	0	TUSKAWILLA RD	WINTER SPRINGS	28.64562	-81.266424

AT&T MOBILITY	0	GREENWOOD BLVD	LAKE MARY	28.74753	-81.344622
AT&T MOBILITY	0	OREGON AVE	SANFORD	28.7946	-81.33514
AT&T MOBILITY	0	W SR 436	ALTAMONE SPRINGS	28.6656	-81.423355
AT&T MOBILITY	0	RED BUG LAKE RD	WINTER SPRINGS	28.64786	-81.269977
AT&T MOBILITY	0	INTERNATIONAL PKWY	KAKE MARY	28.75672	-81.3677878
AT&T MOBILITY	0	LOTUS LANDING BLVD	ALTAMONTE SPRINGS	28.64711	-81.416972
T-MOBILE USA, INC.	0	SHEPARD RD	WINTER SPRINGS	28.7154	-81.323662
VERIZON WIRELESS	0	PALM SPRINGS DR	ALTAMONTE SPRINGS	28.66714	-81.3742885
VERIZON WIRELESS	0	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.6654	-81.3790452
VERIZON WIRELESS	0	ALAFAYA TRL	OVIEDO	28.61341	-81.2089913
VERIZON WIRELESS	0	ESLINGER WAY	SANFORD	28.74779	-81.2982493
VERIZON WIRELESS	0	ESLINGER WAY	SANFORD	28.74717	-81.2969645
T-MOBILE USA, INC.	0	HOWELL BRANCH RD	CASSELBERRY	28.62584	-81.317079
T-MOBILE USA, INC.	0	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66134	-81.3864183
Q BROADCASTING CORPORATION	200	VAN ARSDALE ST	OVIEDO	28.67575	-81.1660288
Q BROADCASTING CORPORATION	200	VAN ARSDALE ST	OVIEDO	28.67513	-81.1662862
Q BROADCASTING CORPORATION	200	VAN ARSDALE ST	OVIEDO	28.67451	-81.1665502
CROWN CASTLE	101	W 1ST ST	SANFORD	28.804	-81.2724197
CITY OF SANFORD	101	FRENCH AVE	SANFORD	28.7998	-81.2727229
SALEM MEDIA	234	RECYCLING PT	LONGWOOD	28.69479	-81.3489075
SALEM MEDIA	234	RECYCLING PT	LONGWOOD	28.69343	-81.3488947

UNKNOWN	100	E ALTAMONTE DR	ALTAMONTE SPRINGS	28.66367	-81.3473847
SALEM COMMUNICATIONS	200	LAKE VIEW DR	ALTAMONTE SPRINGS	28.66769	-81.4310064
DUKE ENERGY	200	N RONALD REAGAN BLVD	LONGWOOD	28.71824	-81.3380094
DUDA AND SONS BUSINESS	200	DUDA TRL	OVIEDO	28.65163	-81.2255133
CITY OF SANFORD	90	E AIRPORT RD	SANFORD	28.76971	-81.2768112
UNKNOWN	100	E 1-4	LONGWOOD	28.72711	-81.3726318
CITY OF SANFORD	80	CENTRAL PARK DR	SANFORD	28.80054	-81.3168386
UNKNOWN	0	RAINER DR	ALTAMONTE SPRINGS	28.65779	-81.4258516
T-MOBILE USA, INC.	0	INTERNATIONAL PKWY	LAKE MARY	28.77672	-81.3570595
T-MOBILE USA, INC.	0	LOCKWOOD BLVD	OVIEDO	28.64568	-81.1771024
T-MOBILE USA, INC.	0	LOCKWOOD BLVD	OVIEDO	28.63147	-81.174913
AT&T MOBILITY	100	TOWNE CENTER BLVD	SANFORD	28.81113	-81.3345068
AT&T MOBILITY	100	TOWNE CNETER BLVD	SANFORD	28.7997	-81.3393514
T-MOBILE USA, INC.	0	WP BALL BLVD	SANFORD	28.80005	-81.3343438
AT&T MOBILITY	100	ORLADNO DR	SANFORD	28.77539	-81.2770042
AT&T MOBILITY	100	ORLANDO DR	SANFORD	28.76783	-81.28141
AT&T MOBILITY	0	W 25TH ST	SANFORD	28.78666	-81.2876655
VERIZON WIRELESS	0	LOCKWOOD BLVD	OVIEDO	28.65197	-81.1790822
APC TOWERS	0	W 8TH ST	SANFORD	28.80395	-81.2914549

Appendix 2: Stakeholders List

Organization Groups/Industry	Person/Title
City Leaders	Craig Dunn – City of Longwood I.T. Director
	Michael Kushi – City of Oviedo I.T. Director
	Patrick Kelly – City of Oviedo Assistant City Manager
County Leaders	Matt Kinley – Fire Department Chief
	Don Harkins – Fire Department Assistant Chief
	Michael Pattison – Fire Department Technology Coordinator
	Christine Patten – Library Division Manager
	Richard Durr – Leisure Services Director
Education Industry	Dick Hamann – Seminole State College of Florida VP of I.T. & Resources/CIO
	John Gyllin - Foundation for Seminole College of Florida VP of Resource & Economic Development
	Bob Everland – Seminole County Public School CTO
Health Industry	Donna Walsh - Florida Department of Health in Seminole County **Health** Officer Administrator
	Ana Scuteri - Florida Department of Health in Seminole County Assistant Administrator
	Chris Collinge - Florida Department of Health in Seminole County **Regional** I.T. Director
	Brian Sullivan – AdventHealth Government Relations Manager
	Tim Cook – AdventHealth Altamonte Springs CEO
EDC/Workforce Group	Nicolet Severe – Sanford Chamber of Commerce President
Other Stakeholders	Morgan Pinkerton - Leisure Services Department; Sustainable Agriculture & Food Systems Extension Agent
	Clay Archey - A Duda & Sons Inc; Sr. Manager, Purchasing and Corporate Facilities
	Kenneth Bentley (Seminole County Public School)

Appendix 3: Business Models Overview

The general requirements throughout Seminole 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. Seminole 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 Seminole County

The right choice for broadband technology is imperative for Seminole 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 26 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 28 - Inputs to Selecting the Right Broadband Approach

Community Needs	Competitive Environment	Organizational Capabilities	Operational Requirements	Financial Requirements	Risk Tolerance

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. Seminole 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 29 - Risk and Reward Continuum of Broadband Business Models
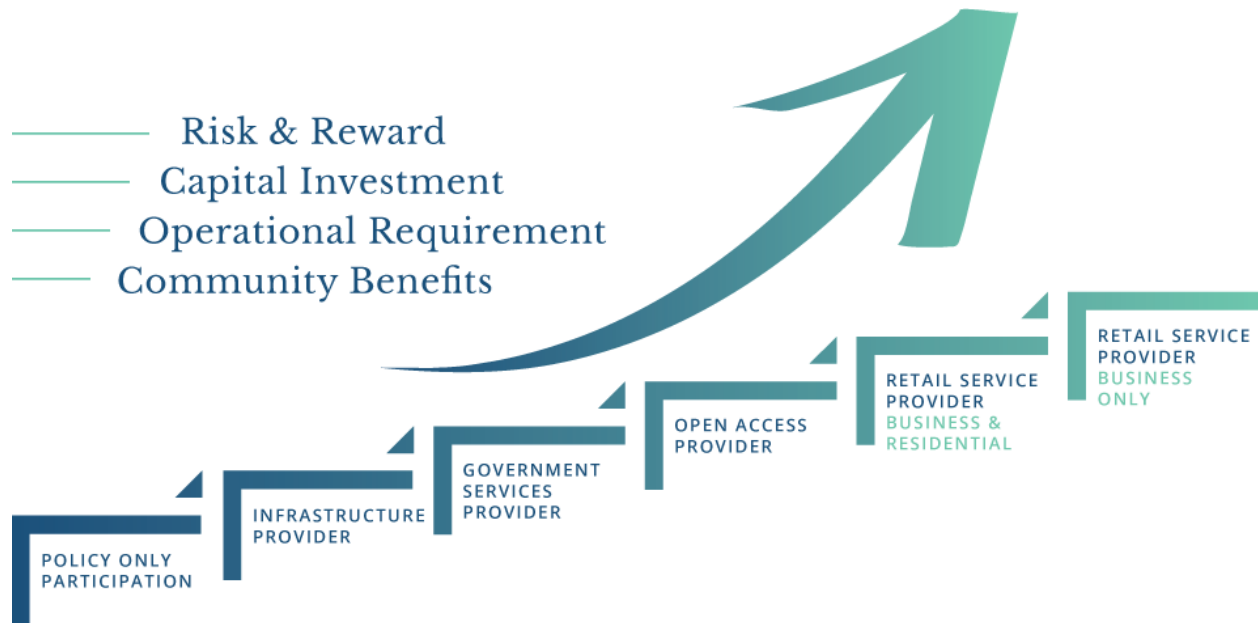
The business models fall on a continuum, illustrated in Figure 27, that ranges from low risk, low investment options to higher risk, high investment options. As a local government evaluates the various business model options along the continuum, it will encounter greater degrees of risk and reward; risk, 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 15 provides a high-level comparison of the business model options.

Table 15 - 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., Seminole 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 Seminole 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.