
SEMINOLE COUNTY, FL

Broadband Feasibility Study

Deliverable 2 - Action Plan



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1. Options for High-Speed Internet

Seminole County government should evaluate a range of technology options that can be leveraged to ensure the broadband infrastructure gaps that remain in the County are sufficiently served by the end of the County's broadband initiative. There is a range of options deployed today by the areas' incumbent providers which could be extended into the Broadband Project Areas identified through this study.

The technologies to be deployed in these areas must ensure the infrastructure is built out for the long-term, able to serve the area's residents for the next several decades, and that it must meet the service requirements of 100x20 Mbps as indicated by the Federal Government in its 2021 ARPA Treasury Guidance. Infrastructure should be terrestrial-based, preferably fiber-optic, with the ability to be upgraded to serve 100x100 Mbps (symmetrical service) and beyond. Any projects the County funds should futureproof these service areas.

There are several technologies and classifications of technologies that could be implemented through this program, including:

DISRUPTIVE TECHNOLOGIES

Broadband, including fiber-optic cable and conduit, is the long-term civil infrastructure that will support the County's project areas for decades to come. This broadband infrastructure is both a local economic development platform and a global innovation engine that has generated new high-speed consumer and business services. Predicting the future 20 or 30 years is challenging, with uncertainties coming from many different angles, industries, and technologies. No local government, investor, or person wants to make a 20–30-year investment decision only to learn that new technology will make it obsolete in 5 or 10 years. This section of the report will discuss several crucial and emerging technologies that could impact and/or enhance local broadband over this period. However, ***fiber-optic infrastructure*** is the “gold standard” for services today with the greatest opportunity.

5G AND 6G AND BEYOND

The most discussed technology that could impact large-scale fiber-to-the-home is “5G”. “5G” is the fifth generation of international mobile wireless standards. Each “G” takes approximately 10-15 years to go from initial requirements consideration, through international standardization, to initial production deployment by major mobile network operators (MNOs). Thus, as 5G is starting to be deployed, work has already begun on 6G. Given the long-term implications of broadband, 6G, 7G, and beyond must be considered as well.

4G (Often called LTE for Long Term Evolution) was the fourth generation standard and was the first optimized for data instead of voice service. 5G takes data service to new levels with three primary design goals. They are high-speed data transmission, ultra-low latency communications, and

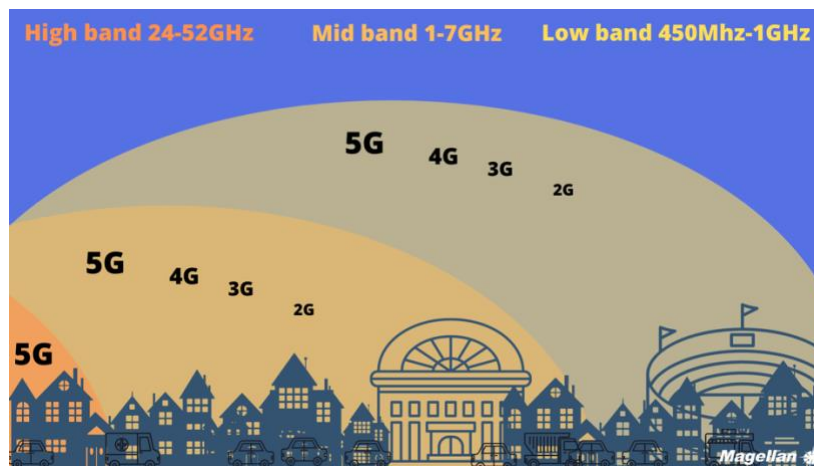
massive-scale Internet of Things (IoT). The latter is characterized by millions of devices sending small amounts of data.

The drivers for mobile networks are “Coverage and Capacity”. This translates into how big an area can be covered from a cell tower or small cell site and what data rates can be provided throughout the area. To achieve the stated design goals of 5G, network operators are planning to ‘densify’ their networks by deploying small cells throughout major cities. These small cell sites are being deployed on many structures, including streetlights, utility poles, and rooftops. For rural areas such as those identified in the Broadband Connectivity Projects, 5G coverage, as explained here, would not be a suitable solution yet.

All of the “G’s” are based on “Licensed Spectrum,” where each MNO pays for the license to use their own dedicated radio frequency bands that only they can transmit on. In the U.S., each MNO has paid billions of dollars for its’ frequency bands. They control access to their bands using SIM cards. This is why an AT&T phone will not work on a Verizon network without switching the SIM card. This is also why you see 2 to 3 rows of radios on the big cell towers around the community. One is AT&T, one is Verizon, and the other is T-Mobile (previously Sprint).

There are tradeoffs among the different bands related to coverage and capacity, as illustrated in the figure below. Low-band frequencies have a wider coverage area but achieve lower speeds, whereas High-band has a smaller coverage area but with greater speeds. These bands are typically deployed in dense urban environments.

Figure 1 - Radio Frequency Spectrum



Permitting small cell sites is an issue for local governments since the FCC and MNOs have created a favorable environment for the MNOs to deploy cell sites easily and cheaply in urban areas. Another area for the County to focus on is the new fiber required to support each small cell. A 5G small cell-only fiber construction project will do little to impact the digital divide and could crowd any shared public resource such as utility poles and conduit. This could raise the costs of a new provider looking to deploy widespread fiber-to-the-premises in the County.

5G represents an opportunity for local government planning agencies to deploy broadband infrastructure such as conduit and dark fiber. As the MNOs densify their network, they will need large amounts of fiber to the macro towers and small cells. Thus, for the wholesale infrastructure provider, the 5G MNOs represent an additional revenue opportunity that improves cash flow and reduces risks.

Mobile coverage and capacity throughout the community is critical for modern society. Though, counties must be careful not to enable 5G upgrades at the expense of ubiquitous fiber. Lastly, no matter what AT&T and Verizon claim, 5G is not a viable alternative to Fiber-to-the-Home.

5G AND BROADBAND

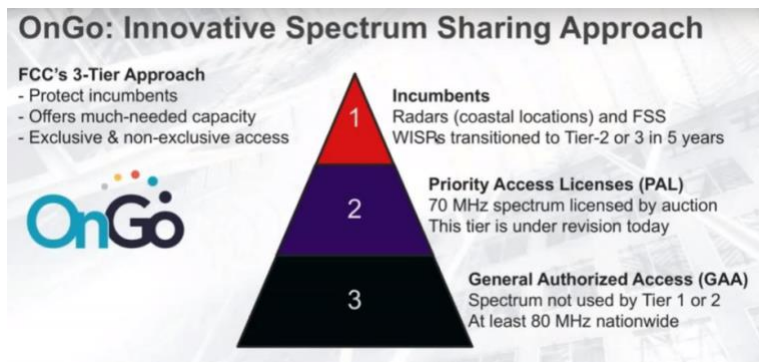
The 5G ecosystem is positioning 5G as an alternative to fiber, even for single-family homes. This includes having consumers use mobile 5G for all their networking needs. In this case, the consumer would use their 5G cell phone as their sole device to access the Internet and the Cloud even if sitting at home. The 5G operators also suggest using the 5G device as a residential access point instead of a Wi-Fi access point (e.g., Wi-Fi Router) attached to a fiber of some sort.

The MNOs are also pushing 5G as a Fixed Wireless Access (FWA) technology in dense urban and suburban environments. In this scenario, they would deploy 5G small cells at the neighborhood level and utilize specialized customer premises devices (CPE) that replace the fiber or cable modem with a 5G modem and use Wi-Fi for in-home connectivity.

CITIZENS BROADBAND RADIO SERVICES (CBRS)

In 2015 the U.S. FCC set aside the frequency band of 3550-3700 MHz (3.5 GHz) for Citizens Broadband Radio Services (CBRS). The FCC used a new, **shared spectrum approach** for CBRS with three tiers of users, illustrated in the figure below.

Figure 2 - FCC'S CBRS 3-Tier Approach¹



Current incumbent tier 1 spectrum users include the U.S. Navy, fixed satellite stations, and, for a limited time, wireless internet services providers (WISPs). With the CBRS approach, these incumbents are protected from interference by other users. Seven Priority Access Licenses (PAL) for

¹ Image from OnGo, a CBRS Trade Association

10 MHz channels between 3550 and 3650 MHz in a specific county were auctioned off by the FCC in July 2020. These licensees are protected from interference by other users but may not interfere with incumbent users. A licensee may aggregate up to 4 PALs for higher data rates. Any portion of the spectrum may be used without a license for General Authorized Access (GAA), but this may not interfere with incumbent or PAL users. The CBRS spectrum can be used for 4G and 5G and can be utilized by MNOs and other service providers such as Cable Companies as well as by private industries and governments. CBRS impacts local broadband and fiber in the following ways:

- **The spectrum is available to everyone and is shared.** This has led to cable companies' interest in using the CBRS spectrum to reach consumers that are 'near' their existing coaxial cable footprint in single and multi-family units using a fixed-wireless access approach and to create a potential national mobility service to compete with the MNOs.
- **The emerging use of this spectrum by private companies to create their own wireless networks.** This allows them to reduce payments to the MNOs and as an alternative to Wi-Fi in-building benefiting the use of applications requiring longer distances than Wi-Fi can provide.
- **Municipalities can also use the CBRS spectrum for their own internal wide and local area networks.**
- **Access to 'free spectrum' for the three big MNOs.** They can utilize this to increase their coverage and capacity in local areas. They are also looking at CBRS to enhance indoor coverage and capacity in large facilities and buildings. In the indoor scenario, MNOs or neutral host companies will deploy CBRS small cells throughout a large building to enhance coverage and capacity in the building and to eliminate the handoff to in-building Wi-Fi.

WI-FI

Wi-Fi is nearly ubiquitous for in-home and in-building connectivity. It has become "table stakes" for many businesses to offer 'Free Wi-Fi' for their customers. Wi-Fi is a wireless local-area network (LAN) protocol based on the IEEE's (Institute of Electrical and Electronics Engineers) 802.11 Ethernet standard. The latest version, Wi-Fi 6, is faster, more efficient, and more flexible. Wider RF (Radio Frequency) channels allow for faster data rates and more sophisticated digital encoding algorithms reduce interference and improve propagation and overall performance.

Today, most broadband service providers deploy Wi-Fi as part of their basic residential broadband service. This is not always the case. Cable and Telephone companies used to deploy broadband modems to terminate their network. Consumers would then purchase a Wi-Fi Router at a retail store and connect it to the broadband modem via Ethernet.

As this architecture proliferated, over 70% of consumer calls to the broadband provider's support centers were Wi-Fi related. Even though the cable and telephone companies did not deploy Wi-Fi as part of their service, consumers still called them first when they had issues. This forced the broadband providers to add Wi-Fi to CPE devices to have more visibility and control of the in-home network. The goal was to reduce costly call center activity as well as expensive truck rolls. This can

be seen by the “Broadband Gateways” now deployed by all major cable and telephone companies. These gateways have Wi-Fi routers built-in with broadband modems in a single device.

This was a major step in the evolution of broadband. Historically, telephone companies, as Title II common carriers, would only operate at Network Layer 1 and Layer 2. This was illustrated by the Ethernet modems initially deployed. By adding Wi-Fi and routing, they moved up the protocol stack to Layer 3 and moved the demarcation point from the modem to the end devices. Now, broadband service providers are adding “whole home” Wi-Fi as part of their consumer offerings. This is no trivial task as each home has unique characteristics, and many require additional Wi-Fi signal repeaters to provide adequate connectivity throughout the home.

New entrants, including local governments who are looking to become a retail internet service provider, must plan to offer and support Wi-Fi which increases both CAPEX and OPEX significantly and requires additional skill sets and expanded call centers. Broadband service providers continue to enhance their Wi-Fi and in-home capabilities for competitive differentiation and to reduce customer churn. This ‘raises the bar’ for a new entrant who must enter the market with a secure whole-home Wi-Fi solution.

DOCSIS 4.0 (DATA OVER CABLE SERVICE INTERFACE SPECIFICATION)

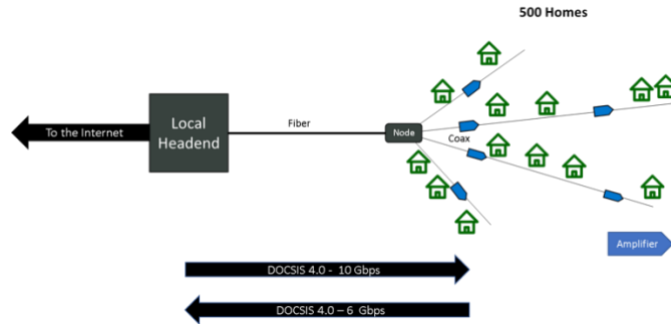
DOCSIS is the Cable TV industry’s standard for high-speed data services. If a cable operator such as Spectrum in Seminole is offering ‘up to 1 Gbps’, they have deployed DOCSIS 3.0 or, more likely, DOCSIS 3.1. The latest standard is DOCSIS 4.0, which increases the aggregate downstream capacity to 10 Gbps and the upstream capacity to 6 Gbps. This translates into the “Up-to” data rates as the aggregate bandwidth is shared amongst the total number of subscribers (Homes) on that segment of the cable network. This is commonly 500 homes per segment.

The most important implication to local governments is that with DOCSIS 4.0, cable companies can increase their Internet data rates by upgrading equipment in their centralized head-ends and hubs and then swapping out Customer Premises Equipment (CPE). This is far less costly than the local telephone company having to construct a Fiber-to-the-Premises (FTTP) network in their footprint. Thus, cable companies, which frequently have a broadband monopoly, as in Seminole, can remain competitive for 5 to 10 years without major outside plant upgrades.

However, to fully realize the highest data rates of DOCSIS 4.0 and to support higher speed symmetrical rates would require the cable TV companies to perform outside plant upgrades. This ranges from “Node Splits,” where the 500 home node is ‘split’ into two 250 home nodes. Thus, the 10 Gigabits of total bandwidth is shared between fewer homes. DOCSIS 4.0 uses higher frequencies in the coaxial cable, which mandates that the installed signal amplifiers, seen hanging from cable wires, are upgraded and re-spaced along the cable plant. This is less of an issue than it would appear since the large cable MSOs are already deploying fiber deeper into their network and thereby eliminating the analog RF cable amplifiers in the process. All of this reduces their power consumption and reduces their operating expenses (OPEX) significantly.

CableLabs is the Research and Development and Standard Development consortium of the cable industry and is responsible for DOCSIS. They have branded DOCSIS 4.0 as a 10G, or 10 Gigabit, platform even though the 10 Gig is shared between 100s of homes. They are also working on future versions of DOCSIS, which will increase both the downstream and upstream bandwidth.

Figure 3 - Illustration of DOCSIS 4.0



PASSIVE OPTICAL NETWORKS (PON)

Passive Optical Networks (PON) are commonly deployed by the local telephone companies as well as some cable companies in new deployments (Greenfields). With PON, fiber is deployed to each home and is aggregated in the outside plant using a passive optical splitter. The splitter is a ‘passive’ device requiring zero electric power. At the splitter, the fibers from each home are terminated, and the optical signals are multiplexed to and from a smaller number of fibers connecting the splitter to the local central office. The number of homes on each PON segment varies, but 32 is the most common for the original GPON (Gigabit PON). Service providers will use 16, 32, 48, 64, and even 128 homes per splitter, depending on the type of PON and other business considerations.

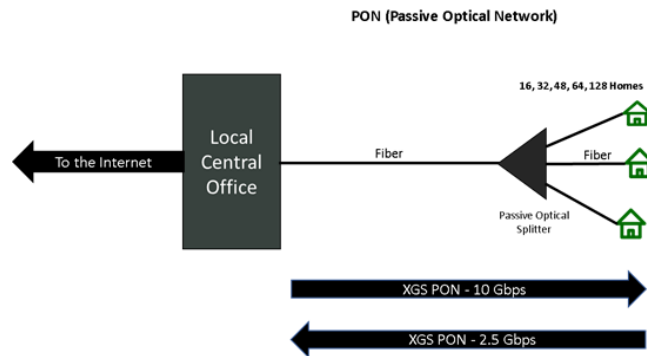
GPON supports 2.5 Gbps downstream and 1.2 Gbps upstream. For a network segment with 32 homes, each home can be guaranteed 78 Mbps downstream. Thus, if all 32 homes are fully active on the network, statistically, each will have a sustainable data rate of 78 Mbps. Similar to cable TV networks, this is where the “up to” data rates originate from. A service provider could offer data rates of “up to” 2.5 Gbps, and some do. GPON was the first PON that was widely deployed.

However, given the trend to 100’s of Mbps to 1 Gbps per home, GPON is no longer competitive for new deployments. To address this, there are 10 Gbps, 25 Gbps, and 50 Gbps PON standards in development around the globe. 100 Gbps PONs are also being considered. XGS-PON is the 10 Gbps standard being widely deployed today. It offers 10 Gbps downstream and 2.5 Gbps upstream. This total bandwidth is shared amongst the total number of homes connected to the passive optical splitter. Here too, the “splits” could be 16, 32, 48, 64, and 128.

PONs give the local telephone companies and competitive providers the ability to offer gigabit services to residential subscribers. However, this requires them to undertake a major fiber construction project in each market they deploy. Given the finite budget of even the largest

telephone incumbents and their massive geographical footprints, fiber deployments will take many years and they will likely be deployed in more affluent areas first.

Figure 4 - Illustration of XGS PON



LEO (LOW EARTH ORBIT) SATELLITES

Existing satellite broadband services from ViaSat and Hughes Network Systems are Geostationary Earth Orbiting satellites (GEO). These satellites orbit the earth from over 23,000 miles above. Even though signals travel at the speed of light, the 23,000 miles up and 23,000 miles down add latencies of up to 700 mSec or almost $\frac{3}{4}$ of a second. For email applications, this is fine. However, for high-speed interactive applications, this latency is highly problematic.

There are at least two Low Earth Orbit Satellites (LEOS) constellations being deployed today. One is Starlink from Elon Musk’s SpaceX Corporation, and the other is a UK-based consortium called OneWeb. These satellites orbit the earth at altitudes of about 350-500 miles. Thus, latencies have been reduced to 30-50 milliseconds from the 600-700 milliseconds latencies of the GEO offerings. Data rates of 50-100 Mbps downstream are expected once the full constellation of satellites is launched over the next few years.

LEO Satellite broadband is substantially better than GEO broadband. However, this should not be considered as an alternative to fiber or other terrestrial alternative for urban and suburban communities. They could be considered as a redundant backup link for local governments, businesses, and residences. For extremely rural, maritime applications and in any location where fiber is unrealistic, LEO satellite broadband is a reasonable consideration.

STREAMING VIDEO

Cable companies not only enjoy high-speed internet monopolies in many cities, they also have a monopoly on traditional Cable TV services. They leverage this, along with voice services, to offer “triple play” bundles of voice, video, and internet access services. The term “Cord Cutting” entered the industry vernacular to describe consumers who only subscribe to Internet services and not the triple-play bundle. The ‘cord’ isn’t really ‘cut’. The services over the cord that are paired back to just internet access.

Streaming video services, led by *Netflix*, have altered the video and TV industries in major ways. Pre-pandemic, it was common that *Netflix* traffic alone accounted for upwards of 50% of all local broadband traffic at peak times. Now there are many streaming services such as *Hulu*, *Amazon Prime*, *Disney* and, *HBO* to name just a few. According to Comcast, 70% of the traffic surge during the pandemic was streaming video, 10% was gaming, and only 5% was video conferencing, including *Zoom*.

These original streaming video services were limited to vast libraries of On-Demand content. You could watch every episode of a TV show, just not the latest one airing on TV. If consumers were interested in watching their traditional channels (e.g., ABC, CBS, FOX, NBC, etc.) and, more important live sports and local news, they were required to subscribe to a traditional cable TV package.

Over the last few years, a number of companies have started offering a TV channel line-up via streaming. *DirectTV Now*, *YouTube TV*, *Sling TV*, *Fubo TV*, and *Hulu Live TV* are early leaders in offering streaming live TV line ups. Many are moving to include local TV stations in their offering as well as eliminating the last major barrier to widescale streaming-only households. All of this will have the effect of further accelerating cord cutting and moving everything to 'Over the Internet'.

This has major implications for public and private fiber providers. The biggest change was the elimination of the need for the broadband provider to offer a traditional TV channel line-up. Just 3-4 years ago, there were not enough cord cutting subscribers for the fiber company to attain the breakeven take rate of homes passed with just internet-only subscribers. Thus, early fiber companies, including Google Fiber, were forced to offer a TV line-up with 150+ channels. This is a complex and expensive effort. A typical video headend costs at least \$5 million to implement. In addition, the new fiber companies had to negotiate distribution agreements with all content producers and owners. They did this from the back of the line, too, as the TV incumbents were in the lead.

Today, cord cutting has reached levels that eliminate the need for a fiber company to offer traditional TV services. The addition of streaming local TV stations and the national live TV networks will accelerate cord cutting, making internet access-only Fiber-to-the-Home even more viable for public and private entities.

CONCLUSION

Broadband, including conduit and fiber, are critical civic infrastructure. It is also a long-term civil infrastructure that should last at least 30 years or more. There are competing network architectures based on wired and wireless technologies, each with its own technology roadmaps and technical advancements. At the same time, there are trends in consumer applications and use patterns that are raising the amount of bandwidth required per household, putting pressure on the incumbents to upgrade their network and/or equipment. Once fiber infrastructure is deployed to each home, future upgrades to 10 Gbps, 25 Gbps, and beyond can be achieved with straightforward electronic equipment upgrades on both sides of the fiber-optic cable, the central office and the

premises. While no one can predict the future with certainty, the passive broadband infrastructure of conduits and fiber will have important uses for decades to come, as Seminole County has already experienced with its own fiber backbone over the last 20+ years.

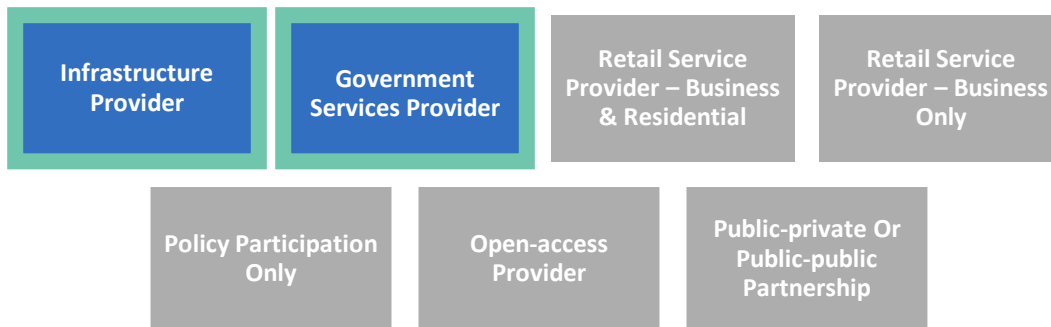
Seminole County should ensure any funding it dedicates and utilizes towards broadband is futureproofed, easily capable of providing a gigabit today, or at minimum 100x100 Mbps (symmetrical) service, and upgradeable to faster speeds in the near future. Seminole County must ensure that the projects they fund and the programs they support close the digital divide while making high-speed broadband 100% available throughout its communities.

Today's opportunity to fund these broadband gaps with federal and state funding is a once in a lifetime chance for the residents in these areas to be connected to high-speed broadband services just like every other resident and business in Seminole County is offered.

BUSINESS MODELS OPTIONS

Selecting the right broadband business model for a local government depends on several factors that, when considered, will suggest the most appropriate option for the organization. These include competitive and market factors that define what options fit well within the current environment, organizational and operational capabilities of the local government and financial and risk factors that determine what risks, rewards, and funding commitments an organization is willing to accept for a broadband initiative.

Figure 5 - Business Models



Seminole County has a long tradition of being entrepreneurial and a technology leader, having built and constructed a significant middle-mile fiber-optic backbone network that connects every corner of the County. That network today connects all Seminole County facilities and provides site-to-site connectivity for municipal and government partners throughout the county like Seminole County Schools, and Seminole State College. We would submit that Seminole County today operates its network as an *Infrastructure and Government Services Provider*, as indicated in the figure above. The County's focus on providing government connectivity using dark fiber and conduit infrastructure is much different than the focus of this Broadband Study – which is on last-mile services for unserved and underserved residents and populations throughout the County. The current business model

employed by the County would not lend itself to easily – or legally given State of Florida law (F.S. 350.81), to expand last-mile services using its network, or to even do so under the County's organization.

The Florida Legislature passed *F.S. 350.81*, "Communications services offered by governmental entities". F.S.350.81 imposes procedures and certain operating practices for counties, cities, or other specified governmental entities that sell cable or telecommunications service, including wireless service. At a high level, restrictions or requirements from F.S. 350.81 applicable to the County include:

- The County would have to hold no less than two public hearings with specified forms of notice "to consider whether the [County] will provide communications services". The public hearings must cover topics stated in the statute.
- The County would have to make a written business plan publicly available encompassing specific information stated in the statute.
- The County could then authorize provision of service by recorded vote.
- Restrictions on County bonding for capital costs include revenues may only be pledged in support of bond issuance for services within the county where the operation is located (F.S. 350.81(e)1.a.), and revenue bonding for capital costs must be approved by electors if the bonds do not mature within 15 years.
- The County would have to adopt accounting requirements such as keeping separate books and record according to generally accepted accounting principles and use of a cost allocation plan generally developed according to OMB Circular A-87(F.S. 350.81(g)). Also, an enterprise fund to account for operation of the communications services must be established (F.S. 350.81(h)). Note that these should be normal operating practices anyway.
- The County would have to adopt separate operating and capital budgets for the communications services (F.S. 350.81(i)) (note that this should be a normal operating practice anyway).
- The County would have to make provisions for review of financial results after "the initiation of the provision of communications services" and if, after four years of operations "revenues do not exceed operating expenses and payment of principal and interest on the debt", public hearings shall be held within 60 days to determine plans for the future (cease operating, dispose of the system, create a partnership with a private entity or approve continuing provision of services by majority vote). (F.S. 350.81(l)). F.S. 350.81 defines "communications services" as "any 'advanced service', 'cable service', or 'telecommunications service' and shall be construed in the broadest sense." "Telecommunications services" means "the transmission of signs, signals, writing, images, sounds, messages, data, or other information of the user's choosing, by wire, radio, light waves, or other electromagnetic means, without change in the form or content of the information as sent and received by the user and regardless of the facilities used, including, without limitation, wireless facilities."(F.S. 350.81(1)(c)and (h)).

Figure 6 - Risk and Reward Continuum



When determining whether and how or if, the County will utilize its fiber-optic network to bring next-generation broadband services to portions of the community, the County will also have to select the most appropriate business model that aligns with the vision of the community and its leadership, and one that fits organizationally into the County’s operating organization.

The commonly implemented business models on a continuum that ranges from low risk, low investment options to higher risk, high investment options are illustrated in the figure above. The business model options along the continuum reflect 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. In addition, moving “up” the continuum also implies greater local government participation in the delivery of broadband services. Public policy and infrastructure only options are considered “passive” business models (the County does not operate a broadband network), while under Government Services Providers, Open Access Providers, and Retail Provider options the County would be involved in operating a broadband network. Public-private partnerships are not classified as a particular business model but instead fall along the continuum because these partnerships take many forms depending on the partner and the negotiated agreement. Local governments must determine which business models meet their organization’s risk/reward tolerance to achieve the community’s broadband goals.

CONCLUSION

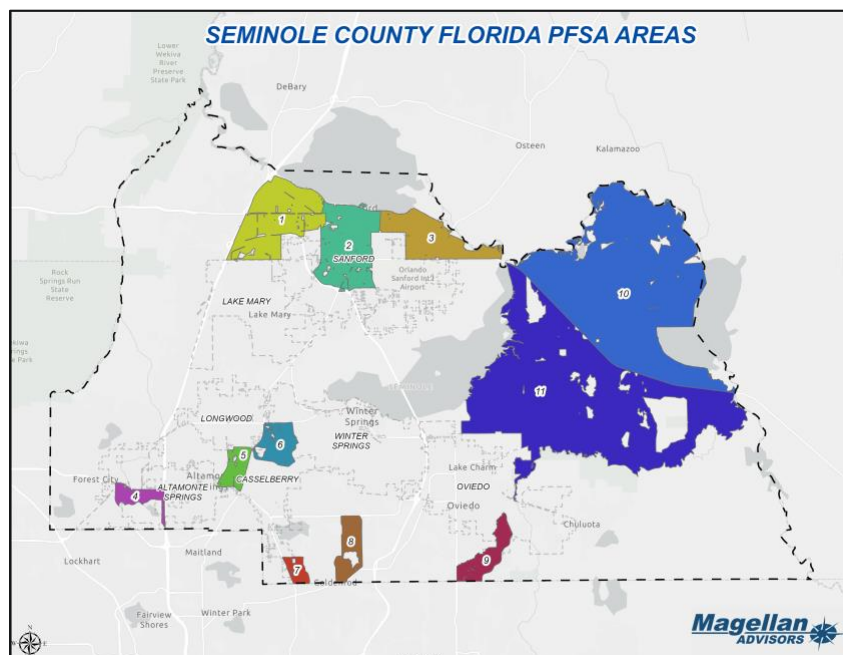
For Seminole County, there are many reasons why the County would not be best served becoming a retail provider of last-mile services. First, its existing fiber-optic network and related assets are not suited for the delivery of broadband services today, many modifications and upgrades would be required for it to do so. Second, the County cannot legally provide last-mile broadband services without complying with F.S. 350.81, which would require the development of a financially sustainable business model.

Additionally, given the findings of this project, the number of unserved households in Seminole County at less than 800 premises would not support the stand up of a new County enterprise, nor support the introduction of a new competitive service provider into this market. In several cases, as will be noted below, there are only handfuls of subscribers (4 in West Sanford, 7 in Casselberry/Winter Springs, and 15 in East Sanford/Midway), where a simple extension of existing incumbent provider facilities would fill the infrastructure gap identified in these project areas, meeting the goal of delivering broadband services to these unserved households.

2. Broadband Connectivity Project

After a significant analysis of Seminole County’s market, available mapping data, GIS analysis, and field surveying, our team has identified a set of Broadband Connectivity Projects which the County should focus its efforts. The figure below depicts the Seminole County PFSA areas which were identified for further review earlier this year, and where Magellan deployed a fielding team to validate our findings. This included deploying field survey teams to these areas to identify infrastructure, or lack thereof, to further the findings of this report.

Figure 7 - Pre-Fielding Project Areas Map



Magellan’s fielding effort identified broadband infrastructure in the urban, more densely populated areas of Seminole County, as indicated on the map. However, fielding efforts have identified numerous issues in these areas related to network infrastructure in poor shape and condition, which could cause service-related issues. As illustrated in the ‘Fielding Images package’ that will be delivered to the County, samples included below, there are significant issues related to existing infrastructure and service areas that could be addressed with the service providers in these areas who own this infrastructure.

Figure 8 – CenturyLink Ped Run Over Brenan Ct



Figure 9 - Pole Removed Spectrum Cable Feeder Hanging 6ft From Ground Holly Rd



Figure 11 - Spectrum WI-FI AP Broken Strand Hanger Piney Ridge Rd



Figure 10 – 144 Count AT&T Fiber Lying On The Ground Oranole and Wymore



Figure 13 – Open and Exposed Spectrum Service Drops St John Parkway



Figure 12 – Broken CenturyLink Ped Ford Dr



The final project service areas identified below are the results of the desktop analysis and fielding efforts and include visual identification of infrastructure or lack thereof in each area. These efforts identified an estimated 778 households that would be considered unserved, lacking access to 25x3 Mbps broadband services. These locations are outlined in the table below, indicating the project area, total footage/mileage of wireline construction, total unserved households and the average distance per household passed.

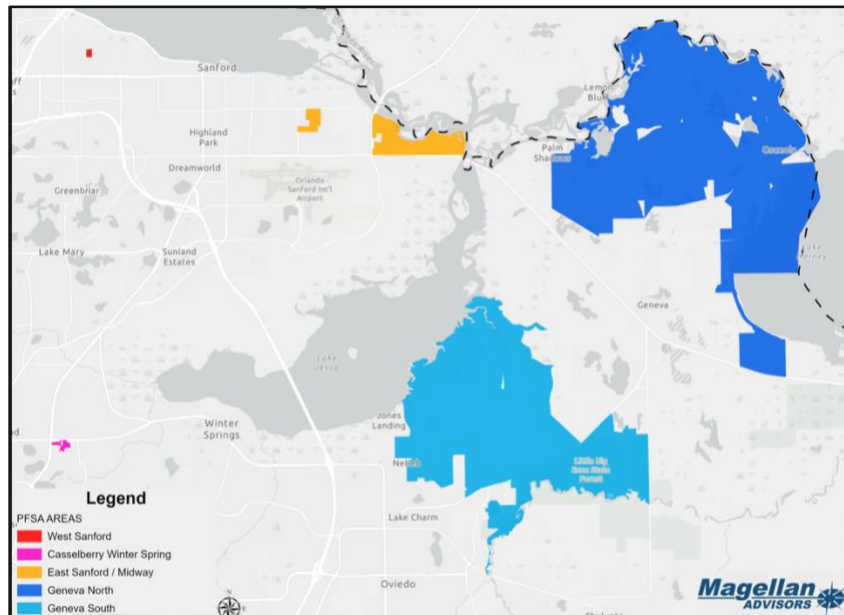
The order of projects presented below is based on the average distance per household passed, which directly correlates to the average cost per household, and the total cost of the project area. The County's goal should be to connect as many households for as little cost as possible. This is the most efficient use of funding to ensure the most households get connected.

Table 1 – PFSA Areas and Area Attributes

| PFSA Area | Total Footage | Total Miles | Total Unserved | Avg. Distance Per Passing | Priority |
|----------------------------|----------------|-------------|----------------|---------------------------|----------|
| Casselberry Winter Springs | 1,173 | 0.2 | 7 | 167.6 | 1 |
| Geneva North | 101,729 | 19.3 | 266 | 382.4 | 2 |
| Geneva South | 199,871 | 37.9 | 486 | 411.3 | 3 |
| West Sanford | 2,525 | 0.5 | 4 | 631.3 | 4 |
| East Sanford/Midway | 11,122 | 2.1 | 15 | 741.5 | 5 |
| Totals | 316,420 | 59.9 | 778 | 406.7 | |

PROPOSED PROJECTS BY PFSA

Figure 14 - Map of Final Post-Fielding PFSA Areas



PROJECT 1: CASSELBERRY/WINTER SPRINGS

Project 1 is an area in Casselberry that is bounded by SR 434 and US HWY 17. Fielding revealed that this area does not have hybrid fiber coax (HFC) or fiber-optic plant available. The map below illustrates the unserved area and includes a high-level design for fiber or HFC to be installed in the locations. As referenced in the table above, the estimate is that 1,173 feet of plant must be constructed to provide service in this area.

Figure 15 - Map of Project Area 1

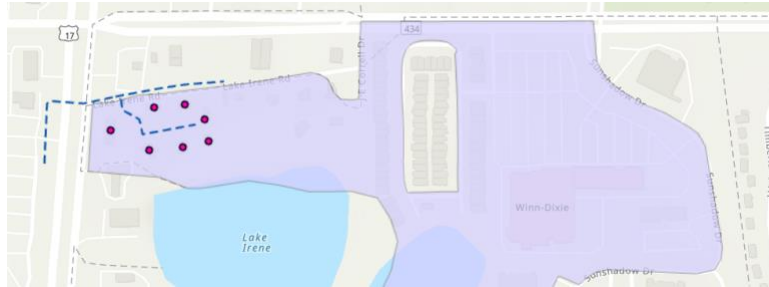


Table 2 - Attributes and Cost Estimates for Project Area 1

| Project Attribute | Attribute Detail/Description |
|--|--|
| # of Households | 7 |
| Footage/Road Mileage | 1,173ft. (0.2 miles) |
| # of Anchors/Businesses | 0/1 |
| CAPEX Cost Estimation: Wireline (HIGH) | \$63,735 |
| CAPEX Cost Estimation: Wireline (LOW) | \$53,112 |
| CAPEX Cost Estimation: Wireless CBRS | \$25,000 |
| Nearby or Likely Service Provider | Spectrum, Fixed Wireless from Carriers |

CONCLUSION

The most likely solution to have Project Area 1 served would be for Spectrum to extend its existing service from US HWY 17 into this neighborhood. This would be a permanent solution that would allow the residents to have improved service immediately.

Another possible solution would be to advise the residents of this area that wireless carriers like Verizon, T-Mobile and AT&T are offering fixed wireless home internet service for reasonable prices. There are two commercial cell towers within ½ mile of this location. This would require no buildout. If the residents qualify for ACP (affordable connectivity program), the service may be free.

PROJECT 2: GENEVA NORTH

The Geneva North area is a large area on the northeast edge of the County. Most of the residents live along the St. Johns River and Lake Harney. There is a small part of the area in the west along Blue Fish Place that has several residents. Fielding revealed that broadband infrastructure is not available in these areas. The residents are using older DSL technology or satellite to obtain service today. Some do not have service. The Map below shows this area.

Figure 16 - Map of Project Area 2

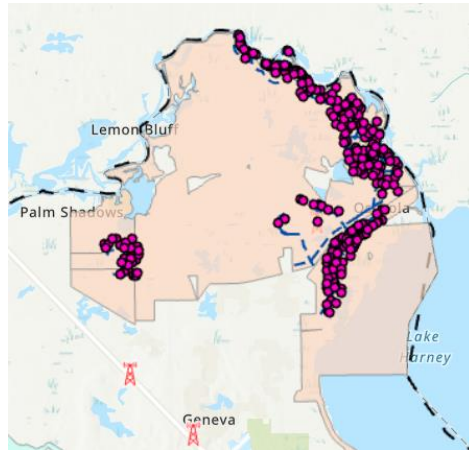


Table 3 - Attributes and Cost Estimates for Project Area 2

| Project Attribute | Attribute Detail/Description |
|--|------------------------------|
| # of Households | 266 |
| Road Mileage | 101,729 Ft (19.3 Miles) |
| # of Anchors/Businesses | 10/0 |
| CAPEX Cost Estimation: Wireline (HIGH) | \$5,574,873 |
| CAPEX Cost Estimation: Wireline (LOW) | \$4,645,728 |
| CAPEX Cost Estimation: Wireless CBRS | \$540,000 |
| Nearby or Likely Service Provider | Spectrum, WISP |

CONCLUSION

Given the number of households in the area, Spectrum may be incented to build the necessary infrastructure. There are many residences, and the population is growing in this area.

A WISP might be incented to build and maintain a wireless overlay network. There is a county-owned tower near the center of the PFSA that could be used for mounting base stations that could support wireless last-mile services.

There are few cellular towers in the area. Fixed wireless from one/all of the carriers might not be possible.

PROJECT 3: GENEVA SOUTH

Geneva South is a larger area that is bounded by St Rd 426 on the east and Lake Jesup on the west. This project area has the most unserved households.

Figure 17 - Map of Project Area 3

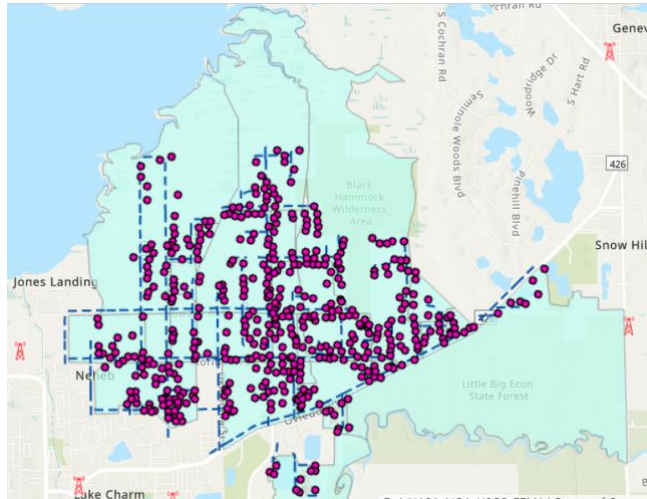


Table 4 - Attributes and Cost Estimates for Project Area 3

| Project Attribute | Attribute Detail/Description |
|--|---|
| # of Households | 486 |
| Road Mileage | 199,871Ft (37.9 Miles) |
| # of Anchors/Businesses | 4/45 |
| CAPEX Cost Estimation: Wireline (HIGH) | \$11,245,366 |
| CAPEX Cost Estimation: Wireline (LOW) | \$9,371,138 |
| CAPEX Cost Estimation: Wireless CBRS | \$755,000 includes base stations and CPE for all Residences |
| Nearby or Likely Service Provider | Spectrum, WISP |

CONCLUSION

The preferred plan would be for Spectrum to expand its network to cover this area. There are many households and a number of residents vocalized their need for better internet. There are several carrier towers around the area, but only two locations that are within the PFSA. Fixed wireless

internet from the carriers may work for many residents. A third alternative is to incent a WISP to build out and manage a private wireless network in the area using CBRS LTE technology.

PROJECT 4: WEST SANFORD

Area 4 is a small area in West Sanford along N White Cedar Rd. There are four residences there that do not have broadband infrastructure. The area is urban and has low to moderate income.

Figure 18 - Map of Project Area 4

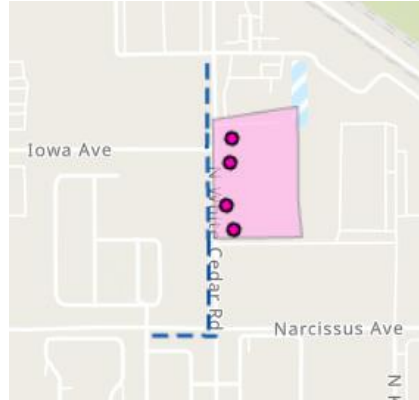


Table 5 - Attributes and Cost Estimates for Project Area 4

| Project Attribute | Attribute Detail/Description |
|--|---|
| # of Households | 4 |
| Road Mileage | 2,525 Ft / (0.5 miles) |
| # of Anchors/Businesses | 0/0 |
| CAPEX Cost Estimation: Wireline (HIGH) | \$106,924 |
| CAPEX Cost Estimation: Wireline (LOW) | \$89,104 |
| CAPEX Cost Estimation: Wireless CBRS | \$25,000 includes base station and CPE for residences |
| Nearby or Likely Service Provider | Spectrum, T-Mobile |

CONCLUSION

A likely solution would be to contact Spectrum and find out why this area is not presently covered by their infrastructure. They could also be incented to build that coverage. A wireless build to cover the four residences would only be feasible if the WISP already had service in this area.

PROJECT 5: EAST SANFORD/MIDWAY

Project Area 5 is composed of two areas in East Sanford. One area is adjacent to Sipes Ave. The other runs along E State Rd 46. Fifteen total residences are identified in the area. Eight residences are located on the St. Johns River and Hwy 46. Seven residences are in the western portion.

Figure 19 - Map of Project Area 5

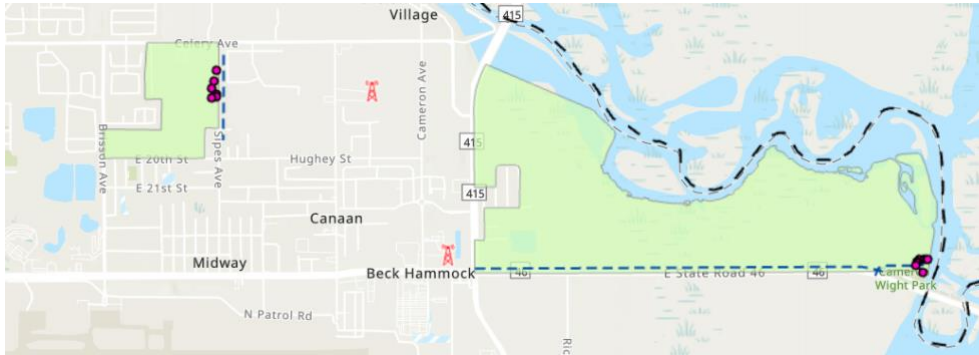


Table 6 - Attributes and Cost Estimates for Project Area 5

| Project Attribute | Attribute Detail/Description |
|--|---|
| # of Households | 15 |
| Road Mileage | 11,222 Ft (2.1 Miles) |
| # of Anchors/Businesses | 0/1 |
| CAPEX Cost Estimation: Wireline (HIGH) | \$514,834 |
| CAPEX Cost Estimation: Wireline (LOW) | \$429,028 |
| CAPEX Cost Estimation: Wireless CBRS | \$70,000 includes base stations and CPE for all residents |
| Nearby or Likely Service Provider | Spectrum, T-Mobile |

CONCLUSION

Spectrum may build out the Sipes area, but the State Rd 46 area is far from the existing plant. There are three T-Mobile towers within 1.6 miles of the eight residences in the east section. T-Mobile is offering fixed wireless services in the area.

FINAL PROPOSED FUNDING SERVICES AREAS SUMMARY

These Proposed Funding Service Areas or Project Areas include a total required investment of between \$16.82 million and \$14.73 million to deploy wireline infrastructure to the areas, or alternatively, \$1.42 million to deploy a wireless fixed point-to-point solution, as summarized below.

Table 7 - Cost Estimates for PFSA Areas

| <i>PFSA Area</i> | <i>Households</i> | <i>Total Footage</i> | <i>High Wireline Estimate</i> | <i>Low Wireline Estimate</i> | <i>Wireless WISP Estimate</i> | <i>Priority</i> |
|----------------------------|-------------------|----------------------|-------------------------------|------------------------------|-------------------------------|-----------------|
| Casselberry Winter Springs | 7 | 1,173 | \$63,765 | \$53,112 | \$25,000 | 1 |
| Geneva North | 266 | 101,729 | \$5,574,873 | \$4,645,728 | \$540,000 | 2 |
| Geneva South | 486 | 199,871 | \$11,245,366 | \$9,371,138 | \$755,000 | 3 |
| West Sanford | 4 | 2,525 | \$106,924 | \$89,104 | \$25,000 | 4 |
| East Sanford/Midway | 15 | 11,122 | \$514,834 | \$429,028 | \$70,000 | 5 |
| Totals | 778 | 316,420 | \$16,820,239 | \$14,730,326 | \$1,415,000 | |

3. Telecommunications Environment



Seminole County's market is well served with an estimated penetration rate of 99.85%² as it relates to 100 Mbps Coverage. According to similar data sources, and from the Seminole Broadband Survey conducted in early 2022, Spectrum is the largest incumbent service provider throughout the County, providing high-speed broadband over hybrid-fiber coaxial (HFC), along with their other service offerings, including cable TV, voice services and other value-added services. Spectrum is the predominant carrier in

the municipal urbanized environments, and to an extent, in the slightly rural areas.



In addition, CenturyLink now Lumen, is deploying Fiber-to-the-Home broadband services in what appears to be strategic pockets of their legacy LEC territory, where traditional copper voice and DSL services are deployed. It does not appear they are doing a wholesale overbuild of their legacy network but choosing more strategic neighborhoods

² Based on BroadbandNow's data sources

that meet their cost and revenue objectives. AT&T is similarly deploying Fiber-to-the-Home infrastructure in pockets of Seminole County.



A new provider, WOW, has announced it will spend \$60 million building out fiber networks in Seminole County. They typically build in new developments or neighborhoods. This is likely to provide some competition to Spectrum in denser areas but is unlikely to help the sparse rural areas.



The big three carriers (AT&T, Verizon and T-Mobile) are all offering Broadband Fixed Wireless Internet to the home service in addition to their fiber offerings. T-Mobile seems to be the leader deploying this technology in Seminole County at the present time. T-Mobile provides 5G and 4G LTE fixed wireless service in households in 50 states in the US. Its home plans main features are contract-free and unlimited data access. The typical download speeds it offers are between 33-182 Mbps and may vary according to location, time of the day, weather, and other factors³. The market research performed by Magellan shows that T-Mobile 5G Home Internet has an average of 40% coverage availability in Seminole County.



Florida High Speed Internet offers Fixed Wireless services to 191 cities and Fiber services to 9 cities for businesses 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.

FINDINGS WITHIN THE PFSA AREAS

In many cases, the areas identified as unserved, and which we believe Seminole County should target its efforts to include neighborhoods, streets, and areas of rural Seminole County where existing providers could likely extend their infrastructure with relative ease given the available funding. The numbers of households within these Project Areas do not lend themselves to creating opportunities for new service provider entrants into the market due to the low numbers of subscribers/households in each area. Perhaps an existing or even startup WISP (wireless ISP) could provide service in the Geneva project areas where there are several hundred customers to serve. However, these areas would be unattractive to any wireline competitive providers.

³ <https://broadbandnow.com/t-mobile-home-internet-deals>

4. Fundings Sources

In 2021 and 2022, Seminole County received a total of \$91.65M of Coronavirus State and Local Fiscal Recovery Funds (SLFRF) through the American Recovery Plan Act (ARPA). From this funding, Seminole has earmarked a potential \$4.7M to fund broadband projects throughout the area. This funding must be utilized and spent by the end of 2026, with funds fully obligated by the end of 2024.

Further, as authorized by President Biden's Infrastructure Investment and Jobs Act (IIJA), an unprecedented amount of funding is being made available to plan for and deploy broadband infrastructure. Over \$47 billion in funding has been allocated to the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA) and the US Department of Agriculture's Rural Utilities Service (RUS), dedicated to broadband deployment.

In addition, IIJA allocated to NTIA another \$2.75 billion nationwide to improve digital equity and digital inclusion initiatives. Finally, IIJA allocated to Federal Communications Commission (FCC) \$14.2 billion to establish the Affordable Connectivity Program (ACP) to subsidize household broadband costs, with the objective of making broadband more affordable to households.

There is a wide range of funding sources that Seminole County should be prepared to consider preparing an application for. Each funding source will have different scoring metrics, eligibility criteria, and application deadlines. Magellan's team tracks all funding opportunities and will update the County when new announcements and Notice of Funding Availability (NOFA) are announced. The following funding opportunities are available to the County in the near term.

BROADBAND DEPLOYMENT FUNDING

NTIA has published a Notice of a Funding Opportunity (NOFO) for the Broadband Equity, Access, and Deployment Program (**BEAD**), offering \$42.45 billion in funding. The NOFO provides an unprecedented opportunity for states to build out last-mile networks for telecom and electric utilities, cooperatives, independent telecom providers, and local and tribal governments. Grant funding opportunities from the states using their funds will be available starting as early as the first quarter of 2023. NTIA is currently developing funding allocations among the states based on counts of unserved and underserved households, and other objective data. All states have filed their notice of intent to participate, including Florida.

When the initial statewide mapping and planning phases are completed and a five-year Statewide Plan has been developed, the Plan will be submitted to NTIA. Once NTIA formally approves the plan, BEAD funds will be released to the State. At that point, the State will offer competitive grant programs to eligible entities.

NTIA has also published another NOFO for the Middle-Mile (**MM**) program. This is a \$1 billion grant program; however, with its very urgent timelines, Seminole would not be able to meet its September 2022 deadline for complete network design and engineering and preparation of the grant application.

RUS will also shortly be issuing the fourth Funding Opportunity Announcement (FOA) for the Rural eConnectivity (**ReConnect**) Broadband Loan and Grant program. The FOA will offer almost \$2 billion, and funds will be awarded most likely before the end of 2022, well before BEAD funds are awarded to the states and subsequently to subgrantees statewide. There will be portions of these funds earmarked for Tribal entities. It does not appear that any areas of Seminole County will be eligible to participate in ReConnect.

DIGITAL EQUITY AND DIGITAL INCLUSION FUNDING

NTIA also published a Notice of Funding Opportunity (**NOFO**) for the Digital Equity Act (**DEA**), offering \$2.75 billion for states to improve and fund digital equity and digital inclusion initiatives. NTIA is currently developing funding allocations among the states based on needs. All states have filed their notice of intent to participate, including Florida.

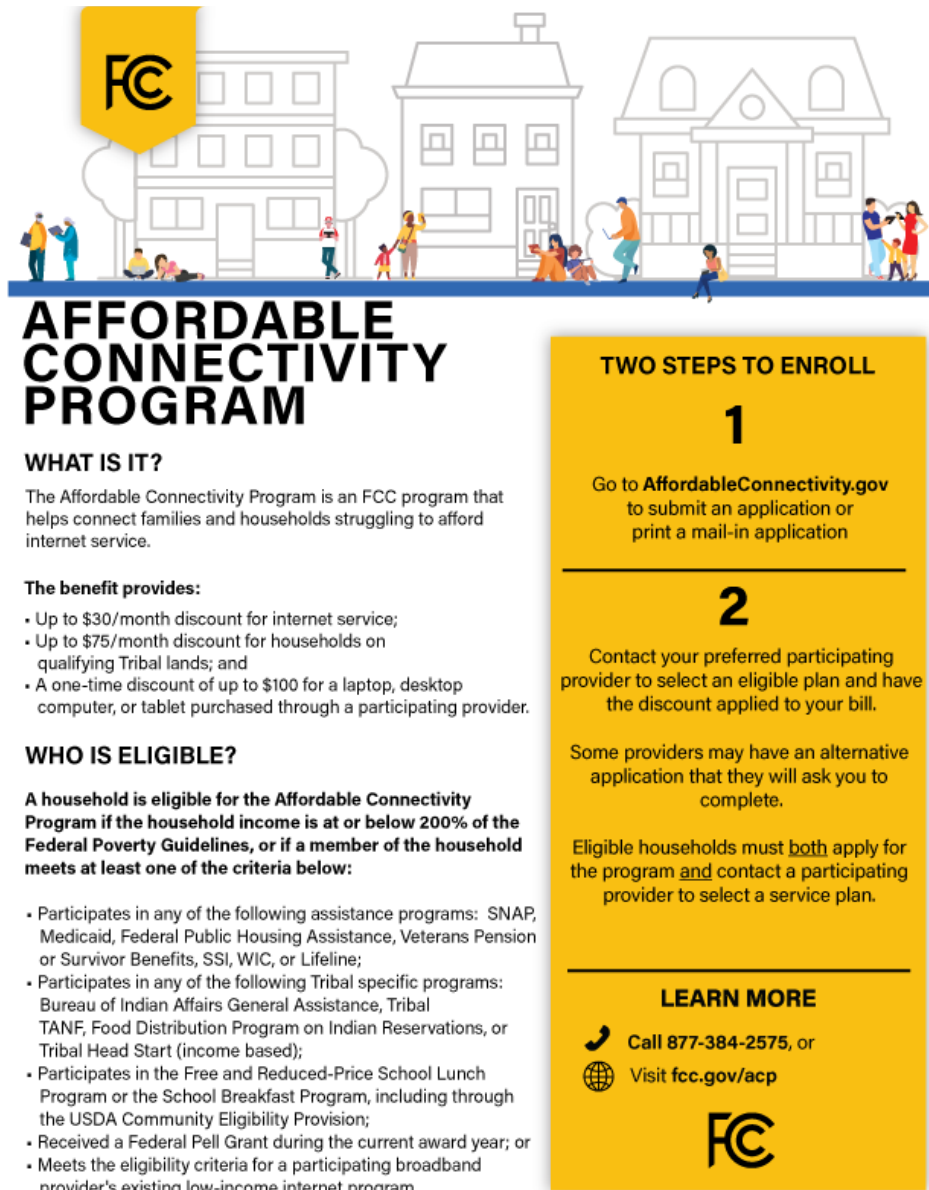
When the initial statewide planning phases are completed and a five-year Statewide Plan has been developed, the Plan will be submitted to NTIA. Once NTIA formally approves the plan, DEA funds will be released to the State. At that point, the State may offer competitive grant programs to eligible entities.

AFFORDABLE BROADBAND PROGRAM (ACP) AND SUBSCRIPTION SUBSIDIES

FCC also recently established the Affordable Connectivity Program (**ACP**), with initial funding of \$14.2 billion. ACP offers monthly subsidies for broadband subscriptions to households receiving assistance from select programs. Subject to submitting supporting information to internet service providers registered with the FCC (or to the FCC directly), households can receive a \$30 monthly subsidy. Tribal households can receive a \$75 monthly subsidy. The program is currently active.

Seminole County has been provided the supporting information for the ACP and has been communicating these benefits to its residents via its communications channels. We recommend Seminole continue a concerted effort to ensure each low-income eligible household signs up for this subsidy program. Seminole County should also ensure its partners in K-12 education, Higher-Education, public housing, public health and the libraries are equally distributing this information.

Figure 20 - Affordable Connectivity Program Flyer



The flyer features an illustration at the top showing a yellow banner with the FCC logo on the left, and a row of three houses of varying styles. Below the houses, several diverse people are depicted in various activities: a person walking, a family sitting on a bench, a person pushing a stroller, and a group of people talking. The main title 'AFFORDABLE CONNECTIVITY PROGRAM' is in large, bold, black letters. Below it, the text is organized into sections: 'WHAT IS IT?', 'The benefit provides:', 'WHO IS ELIGIBLE?', and 'A household is eligible for the Affordable Connectivity Program if the household income is at or below 200% of the Federal Poverty Guidelines, or if a member of the household meets at least one of the criteria below:'. To the right, a yellow box contains 'TWO STEPS TO ENROLL' with numbered steps 1 and 2. At the bottom of this box, it says 'LEARN MORE' with contact information and the FCC logo.

FCC

AFFORDABLE CONNECTIVITY PROGRAM

WHAT IS IT?

The Affordable Connectivity Program is an FCC program that helps connect families and households struggling to afford internet service.

The benefit provides:

- Up to \$30/month discount for internet service;
- Up to \$75/month discount for households on qualifying Tribal lands; and
- A one-time discount of up to \$100 for a laptop, desktop computer, or tablet purchased through a participating provider.

WHO IS ELIGIBLE?

A household is eligible for the Affordable Connectivity Program if the household income is at or below 200% of the Federal Poverty Guidelines, or if a member of the household meets at least one of the criteria below:

- Participates in any of the following assistance programs: SNAP, Medicaid, Federal Public Housing Assistance, Veterans Pension or Survivor Benefits, SSI, WIC, or Lifeline;
- Participates in any of the following Tribal specific programs: Bureau of Indian Affairs General Assistance, Tribal TANF, Food Distribution Program on Indian Reservations, or Tribal Head Start (income based);
- Participates in the Free and Reduced-Price School Lunch Program or the School Breakfast Program, including through the USDA Community Eligibility Provision;
- Received a Federal Pell Grant during the current award year; or
- Meets the eligibility criteria for a participating broadband provider's existing low-income internet program.

TWO STEPS TO ENROLL

1

Go to AffordableConnectivity.gov to submit an application or print a mail-in application


2


Contact your preferred participating provider to select an eligible plan and have the discount applied to your bill.

Some providers may have an alternative application that they will ask you to complete.

Eligible households must **both** apply for the program **and** contact a participating provider to select a service plan.

LEARN MORE

 Call 877-384-2575, or

 Visit fcc.gov/acp

FCC

5. Action Plan and Next Steps

Seminole County should immediately move to take the appropriate steps to enable the funding the County has allocated for ARPA so they can be distributed to entities, or sub-recipients, to deploy broadband infrastructure in the areas identified in this report, or others.

The County should solicit proposals or applications for project areas.

PROCESS

Seminole County should decide whether it should create a Grant Program to administer the use of its Broadband Funding, or whether it should release a competitive bid to decide how to distribute the funding. The County has managed grant funding in the past for various annual funding opportunities for cultural arts events as well as other activities, however, it has not handled programs for broadband funding. It has also created other social programs to distribute ARPA funding in accordance with the requirements. The County could draw from these experiences. This is no different, however, the County will have to ensure all grant funding recipients, including the use of ARPA funding or other federal monies, follow all sub-recipient compliance and reporting obligations.

Many counties across the US have taken similar approaches to distribute broadband ARPA funds to last-mile applicants. Experience and insight can also be drawn from these programs, including Pine County Minnesota’s application, which is currently in progress.

The Pine County Board of Commissioners is currently seeking applications for American Rescue Plan Act (ARPA) Broadband Access Grants.⁴ The County Board may award one or more grants to public and private entities from the Coronavirus State Fiscal Recovery Fund that meet the eligibility requirements set forth in the American Rescue Plan Act of 2021, PL 117-2 (March 11, 2021), which amends Title VI of the Social Security Act (42 U.S.C. 801 et seq.), and the instructions and guidance found in the Interim Final Rule, U.S. Department of Treasury, “Coronavirus State and Local Fiscal Recovery Funds,” 86 Fed. Reg. 26786 (May 17, 2021). **Successful applicants will demonstrate a clear and achievable plan to deliver high-speed, reliable and affordable broadband communications services in one or more unserved or underserved areas in the County.**

The Pine County application and program have been attached as supporting documentation.

TIMELINE

Seminole County has two timelines it should consider. First is the timeline for the development of the Broadband Grant or Proposal solicitation process, which would take upwards of 90-days to execute, as indicated in the figure below.

Figure 21 - Broadband Grant or Proposal Solicitation Process Timeline



⁴https://files4.revize.com/pinecountymn/document_center/Departments/Economic%20Development/Broadband/Pine%20County%20ARPA%20Grant%20Program%20FINAL%205.3.2022.pdf

Seminole County will also have to track to ARPA requirements as it relates to obligating all ARPA funds by 12/31/2024, and fully spending them through 12/31/2026.

Figure 22 - ARPA Funding Timeline for Deployment and Oversight



NEXT STEPS

1. Seminole County leadership should review the project areas identified and confirm this report's findings.
 - The County should solicit feedback from the LTPT and/or the areas service providers (if allowable)
 - And, the County could allow Citizens to comment once the findings are posted to the County's project page (again, if allowable).
2. Seminole County Commission should adopt this report's findings and direct County staff to begin execution of the Action Plan and Next Steps.
3. Seminole County should determine the most appropriate method to efficiently distribute broadband funding to area providers who may expand service to these project areas.
4. Seminole County and its partners should create an educational campaign and should work to ensure each eligible low-income household has signed up to receive funding for services and devices under the Affordable Connectivity Program (ACP).
5. Seminole County should provide oversight of the projects funded and ensure necessary compliance with any sub-recipient requirements of ARPA or other funding it may grant.
6. Seminole County should work to position itself and its local providers to prepare to apply for any last-mile funding programs which the State of Florida or any federal funding agencies

may make available. The County should immediately begin preparing for IJJA BEAD funding to cover any shortfalls beyond the ARPA funding it has allocated to date.

7. Seminole should periodically review these project areas and the County as a whole to ensure the services areas and speeds are consistent with national standards as speeds are updated and redefined by the FCC.

6. Appendices

APPENDIX 1 - PINE COUNTY ARPA GRANT PROGRAM APPLICATION
(ATTACHED AS A SEPARATE COVER)

APPENDIX 2 - SUMMARY OF GRANT FUNDING OPTIONS (ATTACHED AS A
SEPARATE COVER)