



RURAL BROADBAND SOLUTIONS

PRESENTATION BY INSPIRED TECHNOLOGIES INC.



FLORIDA
ASSOCIATION OF
COUNTIES
All About Florida





Founded in 2002, Inspired Technologies is an industry leader in technology support. Inspired specializes in IT support and consulting for county government/city/law enforcement, wireless technologies, 4G/5G installations and support for T-Mobile, Sprint, AT&T, and Verizon, microwave installation, fiber construction, inside and outside plant engineering for internet service providers, and infrastructure cabling for Cat5/Cat6 cabling.



Zack Dunlap is the Vice President of Business Development for Inspired Technologies Inc. and manages the Florida Association of Counties Managed IT Services Program on behalf of Inspired Technologies.

ISSUES FACING RURAL COUNTIES

Access to High-Speed Internet

Costs of
Upgrading
Infrastructure

Limited Amount
of Carriers i.e.
Competition

WHAT IS BROADBAND?

In telecommunications, broadband is wide bandwidth data transmission which transports multiple signals and traffic types. The medium can be coaxial cable, optical fiber, radio or twisted pair. In the context of Internet access, broadband is used to mean any high-speed Internet access that is always on and faster than dial-up access over traditional analog services.

SOLUTIONS

Geostationary Satellite Internet (High Earth Orbit)

Low Earth Orbit Satellite Internet

4G / 5G

Fiber Internet

Cable

DSL

Fixed Wireless

SOLUTIONS

Geostationary Satellite Internet (High Earth Orbit) - Satellite internet is a wireless connection that involves 3 satellite dishes; one at the internet service providers hub, one in space and one attached to your property. In addition to the satellite dish, you also need a modem and cables running to and from the dish to your modem. Once you have everything connected, the provider will send the internet signal to the dish in space which then relays it to you. Every time you make a request (new page, download, send an email, etc.) it goes to the dish in space and then to the (ISP's) hub. The completed request is then sent back through space, to your dish and then to your computer.

COSTS

Example : Hughes Net

PlanPrice

- 10 GB Data Plan \$59.99/mo.
- 20 GB Data Plan \$69.99/mo.
- 30 GB Data Plan \$99.99/mo.
- 50 GB Data Plan \$149.99/mo.

Speeds vary by location and coverage area*

PROS AND CONS

- Pro
 - Satellite internet connections can handle high bandwidth usage, so your internet speed/quality shouldn't be affected by lots of users or "peak use times."
 - You don't need a phone line for satellite internet.
- Con
 - The weather affects the signal path. During bad wind or rainstorms you should expect poor quality internet, assuming you have internet at all.
 - Poor latency or high ping rate. Latency and ping rate is essentially the same thing; they both test how long it takes to communicate between another computer, device, service or server in a network.
 - In the case of satellite internet, it's how fast you send and receive files (the delay or how much lag there is). Since you have to send data to space, to your ISP and back again, satellite internet has poor latency, or a high ping rate. So, satellite internet is not good for you if you're a gamer or if you intend to use VoIP services.
 - Minor obstructions can affect your signal. Your dish need to point south (where all the orbiting dishes are), and anything in the way of your dish's signal such as branches or buildings can affect the quality. This can be a major pain if you live out in the woods.
 - Bandwidth limitations. Each month you'll have so much bandwidth you can use up before your ISP throttles your connections (slows it down). This is in accordance with their Fair Use Policy. Some ISPs do daily bandwidths instead, which is slightly better, as you don't have to wait as long as an entire month if you use up your bandwidth right away.
 - VPNs aren't compatible with satellite internet. They require a low latency, high bandwidth setup which is the opposite of what you'll get with satellite internet.
 - Satellite internet is relatively expensive. You'll pay around \$100 per month for speeds of 2 Mbps.

SOLUTIONS

Low Earth Orbit Satellite - A low earth orbit (LEO) satellite is an object, generally a piece of electronic equipment, that circles around the earth at lower altitudes than geosynchronous satellites. Many companies recognize the benefits of faster satellite internet that new technology and low-Earth orbiting satellite networks can offer to rural customers and businesses. New companies like Starlink, OneWeb*, and Project Kuiper are investing in new satellites systems.

COSTS

Example : Starlink from SpaceX

Plan Price

\$99 a month for speeds up to 250 mbps download and 50 mbps upload

\$499 one time cost up front for equipment

1 year term required

STARLINK ANGEL ACCOUNT PROGRAM

As Space Exploration Technologies Corp. (SpaceX) continues to deploy its Starlink high-speed, low latency broadband network, the Angel Account offering allows any benevolent party (person or entity) to bulk purchase broadband connectivity for an entire community of disconnected end users. Starlink's broadband performance enables connectivity for a wide variety of activities: educational uses, tele-healthcare and workforce and economic development opportunities, all become possible with the Starlink network.

What makes a great Angel Account?

- Angel entities that have funding ear-marked to support community connectivity needs
- End users that do not currently have broadband connectivity

For Angel Accounts in serviceable areas, Starlink offers the following:

- Broadband service for residential consumers and small businesses.
- Easy, out-of-the-box connectivity.
- Capital investments limited to Starlink hardware at end-user locations (i.e., does not require costly infrastructure such as laying miles of terrestrial fiber or erecting wireless towers).

STARLINK ANGEL ACCOUNT PROGRAM

Qualities of Great End Users

- Ensure all end users are co-located
- “Better Than Nothing Beta”— in the early phases of rollout, Starlink will be most valuable to those who are un- or underserved Field of View – Until we launch additional Starlink satellites, locations with clear views of the sky (no to few obstructions) will have higher availability (download Starlink App from app store to check field of view with AR feature)
- Ability to continue funding – after Angel funding has expired, we want to ensure the end user can still receive internet. This can be through self-funding and/or other sources of Angel Account-type funding.

Determine Scope of Purchase

- Angel Accounts can support variety of funding options. Length of service: Minimum 1 year Scope of funding: Hardware & Service – Pay for all

Payment Terms: 100% Up front (on annual basis)

PROS AND CONS

- Pro - Faster speeds than conventional satellite internet services that utilize High Orbiting Geo Spatial Satellites (HughesNet, ViaSat, etc.). Allows for VPN capabilities due to low latency.
- Con – Requires much more satellites in space due to the speed in which each satellite travels in low orbit. Upfront costs for equipment double that of other providers.

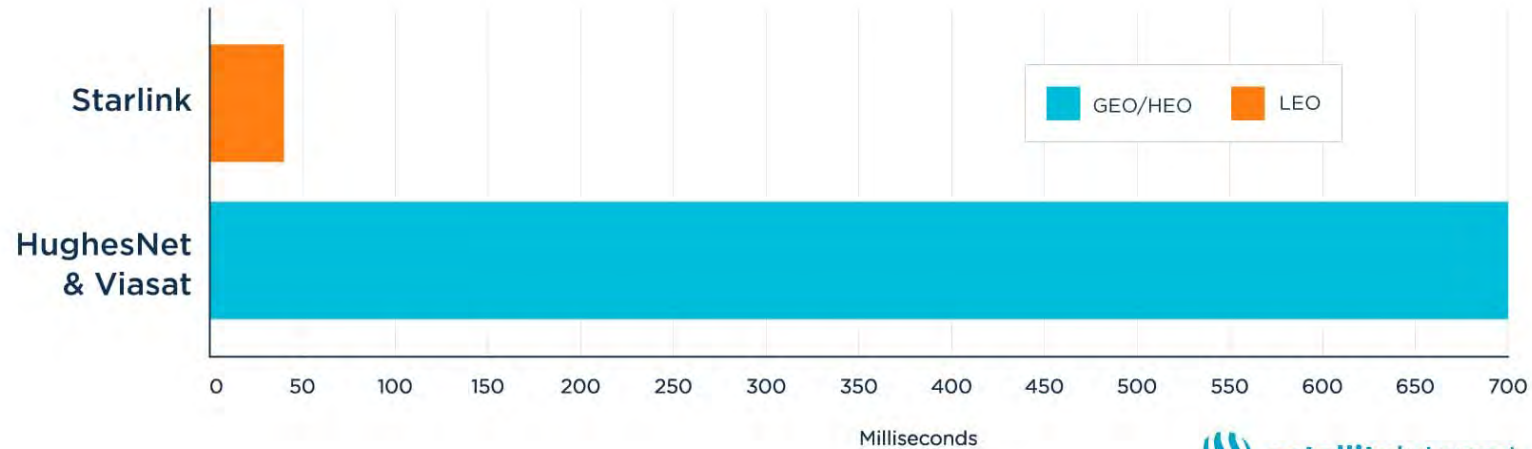
DISTANCE FROM EARTH

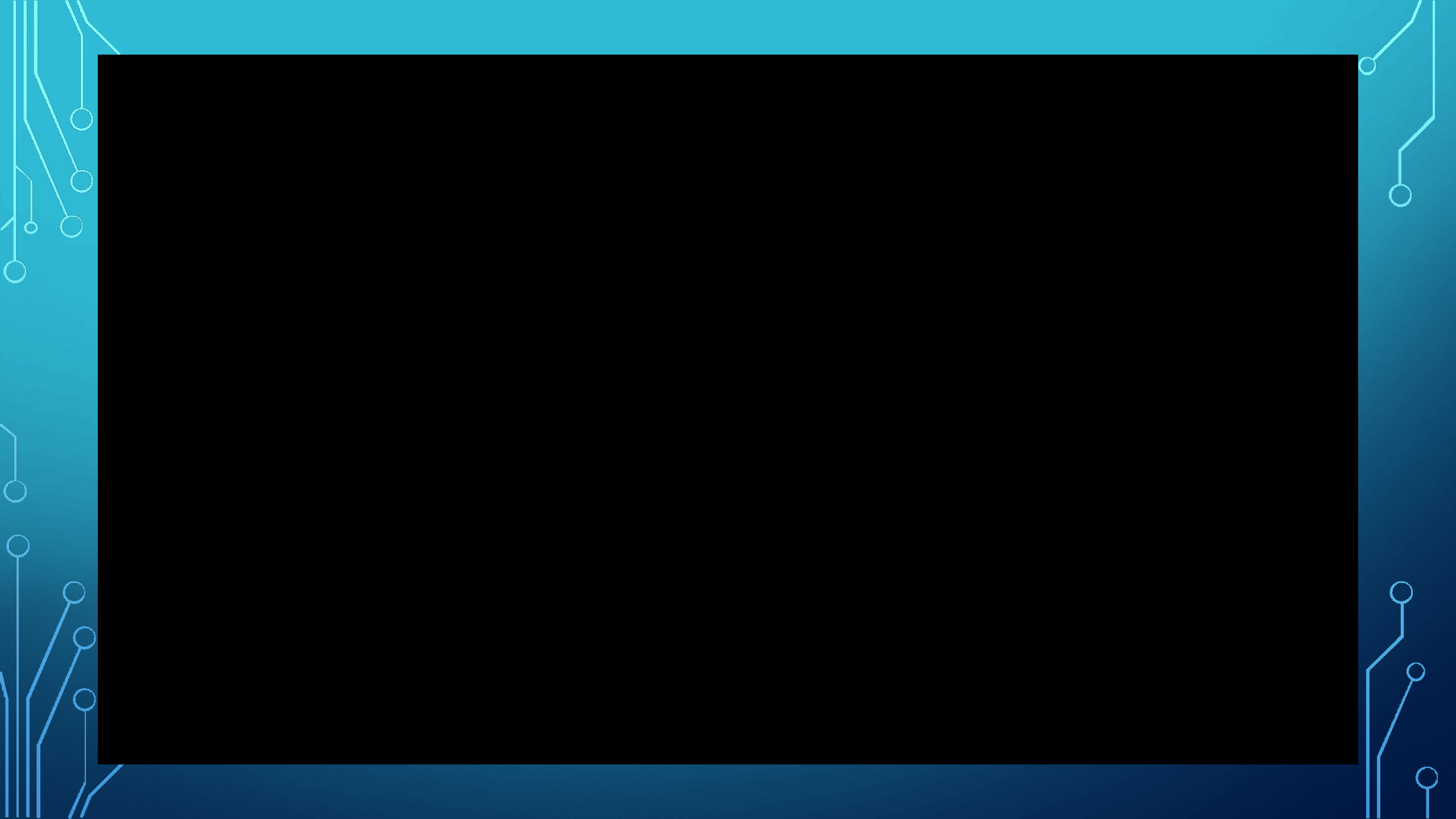
- 5–6 miles: Airplane cruising altitude (9–11 km)
- 24 miles: Weather balloons (40 km)
- 111–1,242 miles: Low-Earth orbit (180–2,000 km)
- 203–360 miles: Starlink satellites (328–580 km)
- 205–255 miles: International Space Station (330–410 km)
- 339 miles: Hubble Space Telescope (547 km)
- 621–1,242 miles: Van Allen Belt (1,000–2,000 km)
- 1,242–22,232 miles: Mid-Earth orbit (2,000–35,780 km)
- 12,551 miles: GPS satellites (operated by the US Space Force) (20,200 km)
- 22,246 miles (approx.): ViaSat and HughesNet satellites (35,802 km)
- 23,000+ miles: High-Earth/Geostationary orbit (37,015+ km)
- 238,607 miles: Moon (384,000 km)

LATENCY HIGH EARTH ORBIT VS. LOW EARTH ORBIT

Comparing Satellite Internet Latency

For high-speed internet services, it is often **latency** (measured by milliseconds) rather than the bandwidth that determines the user experience.





CELLULAR

4G - 4G, short for “Fourth Generation,” is a specification laid down by the International Telecommunications Union (ITU) in 2008.

Specifically, this was laid down by the ITU-R (which deals with radio communications). 4G is known today primarily for its broadband capabilities and significantly faster speed than 3G, which introduced data connectivity into the cellular space.

CELLULAR

5G - 5G is the new standard laid out by the ITU and looks to be following a similar trajectory to what 4G did. Phone manufacturers are just now coming out with 5G compatible phones, but carrier networks are not yet near the minimum 1 Gbps with 1 millisecond of latency required for the standard.

COSTS

AT&T Unlimited Elite Monthly Cost: \$85 Amount of Data: Unlimited*

Verizon Play More Monthly Cost: \$80 Amount of Data: Unlimited*

T-Mobile Magenta Monthly Cost: \$70 Amount of Data: Unlimited*

Speeds vary by coverage area

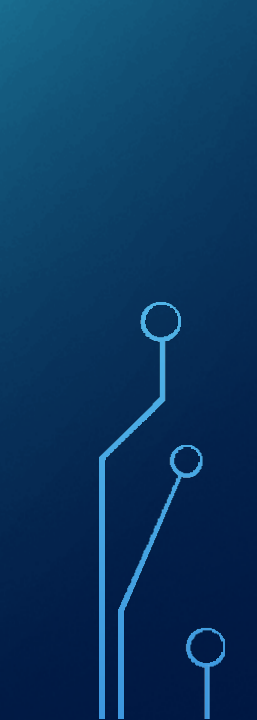
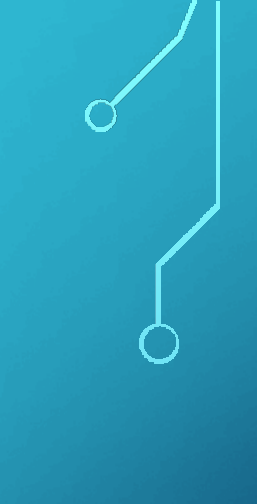
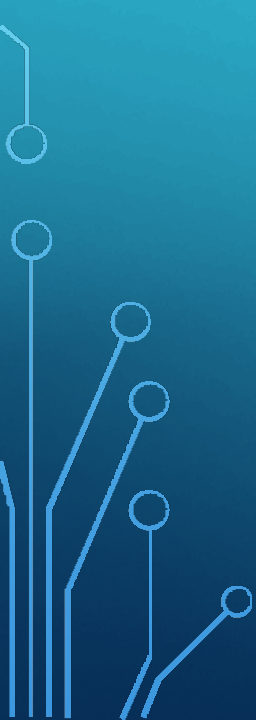
PROS AND CONS

- Pro – Existing cellular customers can easily access services, use under current plan. Speeds are similar in certain areas to Cable and DSL.
- Con – Coverage area in rural areas not sufficient for wide usage or supporting multiple devices and varying speeds for data. Costs for infrastructure and ROI (return on investment) not sufficient for cellular companies to justify build out in rural areas.



SOLUTIONS

Fiber Internet- Fiber to the home (FTTH) connections employ fiber optic cables all the way to your home. Also known as “fiber to the premises,” FTTH offers the best in bandwidth, reliability and speed consistency. Speeds can vary from 50 mbps to over 1 gbps.



COSTS

No rural areas have deployed a fiber to the home solution in Florida. Most urban areas that have access to home fiber pay anywhere from \$75 to \$300 or more a month depending on speed and availability*.

PROS AND CONS

- Pro – Fastest and most reliable internet service available
- Con – Cost of construction to rural homes is cost prohibitive and not feasible, no way for private companies to recoup costs.
- Example 1 mile of aerial fiber to install averages from \$10k to \$25k depending on condition of poles, compared to underground fiber 1 mile at \$50k to \$100k

SOLUTIONS

Cable - A form of broadband Internet access which uses the same infrastructure as cable television. Like digital subscriber line and fiber to the premises services, cable Internet access provides network edge connectivity (last mile access) from the Internet service provider to an end user. It is integrated into the cable television infrastructure analogously to DSL which uses the existing telephone network.

COSTS

Depending on the provider and package, anywhere from \$25 to \$200 or more a month depending on what services are bundled together, speed and availability.

PROS AND CONS

- Pro

- Substantially faster than other types of broadband connections such as dial-up, high orbit satellite, and DSL, which allows you to transfer data such as photos, music, and videos at high speeds.
- Supports data-heavy activities such as online gaming, which makes your playing experience of a higher quality.
- Not as susceptible to dropout as dial-up Internet is.

- Con

- Speeds are slower than those you receive with fiber-optic Internet, and the connection speed you receive often depends on how many people in your area are connected to the Internet at once. You may also have slower connection speeds during peak hours when many people are online.
- Not available in most rural areas.
- Cost to build out are similar to costs for fiber construction

SOLUTIONS

DSL - Digital subscriber line (DSL; originally digital subscriber loop) is a family of technologies that are used to transmit digital data over telephone lines. In telecommunications marketing, the term DSL is widely understood to mean asymmetric digital subscriber line (ADSL), the most commonly installed DSL technology, for Internet access. DSL service can be delivered simultaneously with wired telephone service on the same telephone line since DSL uses higher frequency bands for data.

COSTS

Depending on the provider and package, anywhere from \$25 to \$200 or more a month depending on what services are bundled together, speed and availability.

PROS AND CONS

- Pro
 - DSL is much faster than dialup, and for not much more money. For the price it's competitive with entry level cable internet.
 - You don't have to share your internet connection with your neighbors like you do cable. So, you don't have to worry so much about "peak usage periods" and your internet slowing down.
- Con –Speeds do not meet the new definition of high-speed internet. The quality of your DSL service heavily depends on the distance from you and the internet service provider's hub. The farther away you are, the poorer and/or slower the internet connection.

SOLUTIONS

Fixed Wireless/ Wireless Broadband -A wireless broadband network is an outdoor fixed and/or mobile wireless network providing point-to-multipoint or point-to-point terrestrial wireless links for broadband services. Providers of fixed wireless broadband services typically provide equipment to customers and install a small antenna or dish somewhere on the roof. This equipment is usually deployed as a service and maintained by the company providing that service. Fixed wireless services have become particularly popular in many rural areas where cable, DSL or other typical home internet services are not available.

COSTS

Varies by area and service provider.

*Up to 25Mbps down and 3Mbps up as low as \$45 per month to *100Mbps down and 20Mbps up as low as \$60 per month in Walton and Washington counties.

*Up to 5mbps down and 1mbps up for \$69.95 per month to 50mbps down and 10mbps up for \$450 a month in Hardee County.

*speed calculations and costs provided by vendor website

PROS AND CONS

- Pro – It's easier to set up the equipment needed for fixed wireless internet than it is for other broadband services, because it doesn't require physical cables or the hassle they entail. Unlike traditional cellular services, fixed wireless internet usually has either very high caps (100GB of data or more) or no caps at all. Additionally, the technology offers high download speeds that are just as fast if not faster than those you get from other broadband services.
- Con –The problem with fixed wireless internet is that the connection isn't always stable. Rain, fog, and other weather conditions can affect its strength. There also has to be a line of sight between the receiver on your house and the wireless base station. Obstructions such as trees and hills can affect the quality of the service and can even prevent it from being set up. Then there's also the price: fixed wireless internet is usually more expensive than other forms of broadband for the speeds comparatively.

IN CONCLUSION

When evaluating broadband solutions, its important to understand that the FCC current definition of high-speed internet minimum is 25 Mbps down/3 Mbps up, however there is a push by Congress to change the minimum to 100 mbps down and 50 mbps up*. So, if your evaluating solutions do so with the mindset that the definition of high-speed internet will likely change soon.

SOURCES

- <https://www.itu.int/en/ITU-R/Pages/default.aspx>
- <https://www.engadget.com/senators-fcc-change-definition-high-speed-broadband-222150947.html#:~:text=Under%20the%20current%20FCC%20policy,the%20minimum%20standard%20for%20broadband>
- <https://wildstarnetworks.com/internet-walton>
- <https://www.rapidsys.com/services/rs-air-wireless-inernet/>
- <https://www.tomsguide.com/best-picks/best-unlimited-data-plan>
- [https://www.satelliteinternet.com/resources/what-is-low-earth-orbit-satellite-internet/#:~:text=Low%2DEarth%20orbit%20is%20the,\(180%E2%80%932%C000%20km\).&text=Howev,er%2C%20communications%20satellites%20that%20deliver,37%2C015%20km\)%20above%20sea%20](https://www.satelliteinternet.com/resources/what-is-low-earth-orbit-satellite-internet/#:~:text=Low%2DEarth%20orbit%20is%20the,(180%E2%80%932%C000%20km).&text=Howev,er%2C%20communications%20satellites%20that%20deliver,37%2C015%20km)%20above%20sea%20)
- <https://broadbandnow.com/report/fcc-broadband-definition/>