

Fixed Wireless Broadband offers advantages over Satellite Internet

The great advantages of living a rural lifestyle are well known to all of us - no traffic, clean air, natural beauty, no crowds of people. It's probably why we all live here, despite the many (also well-known) disadvantages, such as lack of broadband. However, more and more residents are starting to have the option of "Fixed Wireless" broadband available to them. This is not cable or fiber or the other "wired" technologies, but it can still be very good and high-speed. High-speed broadband opens up so many possibilities for residents, from putting your business online to online educational opportunities to streaming Netflix (or for the more politically-minded, our Board of Supervisors meetings). Tourists want to stay in places where they can keep in touch with family and share their photos of our beautiful views. Broadband access increases the value of your property. Fixed Wireless technology is quite different from the high-latency satellite or high-priced cellular that has been the only option for many rural residents until now. I would like to discuss what exactly Fixed Wireless is, and how it compares to satellite service.

How exactly does a Fixed Wireless service work?

Wireless networks are actually a "hybrid" fiber optic and wireless network, as fiber is required at some point to "backhaul" data to the larger internet world. The Wireless portion, often provided by "Wireless Internet Service Providers", or "WISPs," brings high-speed connectivity to the end-user's household. WISPs often purchase bandwidth from a larger provider, usually AT&T or Level 3 in Mendocino County, or if they have transport ability from data centers in San Francisco. Bandwidth from these fiber optic lines is then distributed via high-speed point-to-point wireless links to specific mountain-top and relay distribution points. From these points, WISPs directly provide wireless service to subscribers who have installed the small Fixed Wireless antennae on their home roof. From there the signal is brought inside your home to your computer via a cable, or if desired, directed through a router to a wifi signal. Since a line of sight from your rooftop to the specific WISP relay location is required for service, a site visit from the provider is necessary to confirm that service is indeed available. And because WISPs have different mountain/relay points, if service is not available from one WISP provider, it may very well be available from a different WIS provider.

How reliable is Fixed Wireless? Does weather affect service?

Fixed Wireless service is extremely reliable and is not affected by weather such as rain, fog, and clouds. WISPs who had backhaul independent of AT&T fiber were not affected

by any of the recent AT&T outages. Many WISP relay sites are solar-powered, which makes for a reliable and sustainable way to power equipment. Since these providers are locally-based, technicians usually reside within the county and are available to fix problems that may arise.

Q: What are the Internet speeds and costs? Is there an installation fee?

Typically WISPs offer service tiers with increasing prices for increasing speeds. Check individual provider websites for details of their specific plans. Most offer tiers meet the CPUC definition of “high-speed” broadband at levels of 6 Mbps download and 1.5 Mbps upload. Some offer “unlimited” data, while others have data caps on total amount of monthly data that is allowed before the service is slowed down. There is typically a one-time installation fee, and usually no contract. But again, each provider is different. All however have low latency, which is an important metric in how your internet experience feels. In fact latency is so important that it deserves it’s own discussion, which you will find next.

So...what is the big deal about latency?

There is more to an Internet connection than just bandwidth (speed)... there is latency. Latency is how long it takes data to travel between its source and destination, and is measured in milliseconds (MS) or “ping” when it’s round trip. Satellite ping is typically 500~800 MS, while fixed wireless is typically ~30 MS. Latency manifests as a delay, and this can make a satellite Internet service rated at 15 Mbps with high latency perform noticeably worse than a fixed wireless service rated at 6 Mbps and low latency. You won’t hear satellite providers talking about latency for this reason.

Imagine you have a satellite connection and are sitting at your computer and you click a website link. The request for the website goes from your computer to your modem, out to your dish which transmits the signal to a satellite 22,000 miles away in space. From there the signal bounces *back* down to earth to the company’s ground-based station, called a gateway. From the gateway the signal travels along the terrestrial system connected to the Internet, grabs the data from the website, and takes it back to the gateway, which shoots it back up into space to the satellite, which then shoots it back down to your home. This means a signal often travels about 90,000 miles (depending on how far the ground terrestrial network is). Although it’s pretty amazing and seems to happen quickly, in digital time... it’s slow. It’s hard for technology to beat physics.

The problem is then compounded by the way today’s webpages load. There is not just one request for data, but rather many, often hundreds. You make the first hit to a page,

and pay your first latency. Then that HTML calls for perhaps a dozen other downloads. Your second payment. Some of those will call for further downloads, giving you your third, and so on. With https this is all doubled due to the encryption protocol. Each request involves a round trip and each latency adds up and results in a delay. If you were having a skype-chat with a friend with such a connection, you would be out of sync with each other. Such delays make online applications such as video-conferencing, telecommuting (remote logins often fails) and gaming impossible.

For a good discussion of latency using a waterpipe analogy (for those folks who like concrete examples) go here: <http://www.speedtest.net/articles/what-is-ping-what-is-latency/>

How does Satellite service compare to Fixed Wireless?

There are very good quality, community and economic considerations in deciding which Internet Provider is best for you.

Quality Reasons: Satellite Internet is not considered “broadband” by the California Public Utilities Commission, due to the high latency. Satellite was designed for those without any other options and while it’s definitely better than dial-up, even “high speed” can be experienced as slow. Experiment for yourself - choose a website and use a friend’s low-latency Fixed Wireless Internet to surf around; then go to that same website using a friend’s satellite Internet and compare how it feels. Satellite service can also be influenced by weather and sunspot activity, which do not affect fixed wireless service. With satellite you are disadvantaged for certain applications, and even though you may think you don’t have a need to Skype for example, you may change your mind when that grandbaby who lives across the county arrives. More possibilities and options are open to you when you are on true broadband, and you won’t have to pass up such opportunities. Fixed Wireless can typically scale to reach faster speeds if need be, while satellite has limited capacity in terms of bandwidth (maxed out at about 14 Mbps) and number of customers. Satellites can also quickly become over-subscribed, which is why most satellite plans have data caps. Satellite users have complained that speeds that had been fairly consistent can suddenly drop as more customers are added to the satellite. Airplanes offering “onboard internet” use these satellites which can also cause unexpected congestion. When a satellite reaches capacity, it cannot be easily upgraded since that involves launching new satellites into orbit, compared to terrestrial equipment can be upgraded fairly easily. Individual data usage is only going up, and so these issues can be expected to increase even as advances in both technologies are being made.

Community reasons: In a Fixed Wireless network, more subscribers make for a stronger network, both in terms of quality and sustainability. Backhaul costs are part of every

WISPs financial equation and if there are too few subscribers to cover these costs, then a start-up or small network may not survive long-term. Having a local network adds community value, and allows residents who may not be able to afford the more expensive satellite to have broadband options available to them. Many WISPs offer local Fire Departments and other non-profits free service; you won't find the satellite companies offering such free services. More Fixed Wireless subscribers also improve service to an entire area, as one house can act as a line-of-sight relay for another house if necessary in a "mesh" type network. Subscribers to a specific satellite can come from any geographic area, so this is not a concern. In addition, satellite equipment is larger and heavier (and must be precisely aligned) and so has more visual impacts. And finally, with WISPs you will be typically be supporting a locally managed and operated network which will invest their profits back into expanding their network here in Mendocino, versus HughesNet with corporate headquarters in Maryland, Dish Satellite (Colorado), or ViaSat (San Diego).

Economic reasons: Satellite service typically locks you into a 2-year contract at expensive prices. At a typical satellite price of \$85/month for 24 months, you pay a total of \$2,040. For a similar internet experience at a typical WISP tier of \$65/month for 24 months, it is only \$1,560 for 2 years (but probably no contract required), for a savings of almost \$500. These comparisons will vary of course depending on your needs and the tier selected, so do your own math. But typically the economics are in favor of Fixed Wireless.