



## Fiber to the Home Offers Opportunity for Wireless Internet Service Providers

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Wireless internet service providers (WISPs) play an important role in providing broadband internet connectivity to rural areas that traditionally have been too costly to serve using other technologies. Typically, WISPs use point-to-multipoint wireless equipment in a fixed configuration to deliver data rates that exceed what incumbent telephone companies can provide using digital subscriber line (DSL) technology and in some cases may be competitive with cable company offerings.

Recently, some WISPs have begun to deploy or consider deploying fiber-to-the-home (FTTH). While initial deployment costs are higher for FTTH than for fixed wireless, FTTH can support exponentially higher data rates and has a much longer equipment lifespan. In some scenarios, WISPs may find that FTTH can provide a higher rate of return in comparison with fixed wireless over a 10-year period. (See Appendix.)

A recent Clearfield survey asked WISPs about fiber's importance to expanding service offerings. Nearly two-thirds (62.5%) of respondents rated fiber a 5 on a scale of 1-5, with 5 meaning very important. Another 25% of respondents gave fiber a 4-rating. No one rated fiber less important than 3 on a 5-point scale.<sup>1</sup>

In this white paper, we explore the economics, challenges and opportunities of the WISP business. We also compare fixed wireless and FTTH technologies and deployment costs and discuss which technology can best meet customer needs for various deployment scenarios.

## **The WISP Business**

There are more than 2,000 broadband wireless providers serving nearly four million customers in the U.S. today, according to a report prepared by The Carmel Group for the Wireless Internet Service Providers Association and Wireless Communications Association International. An average WISP serves about 1,200 customers.<sup>2</sup>

WISPs typically serve rural areas where high-speed broadband is not widely available (if at all) from incumbent telephone or cable companies. Traditionally, fixed wireless technology has been relatively fast and inexpensive to deploy in comparison with landline options. The positive return on investment (ROI) for a fixed wireless deployment can be less than 18 months, according to WISP sources.

It's quite common for WISPs to deploy fixed wireless equipment from multiple vendors and in different spectrum bands because different offerings are better suited for different deployment scenarios based on topology, population density, availability of structures, etc. In addition, fixed wireless technology has continued to advance, with later generations supporting higher bandwidth than earlier generations. Today's systems typically offer download speeds in the range of 5 to 50 Mbps but some systems can support download speeds of up to 1 Gbps.<sup>3</sup> This has made the technology increasingly competitive with coax-based broadband from cable companies and DSL from telephone companies, whose network facilities have been degrading.

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<sup>1</sup> Clearfield survey of wireless internet service providers. 2017.

<sup>2</sup> "Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless" by The Carmel Group for the Wireless Internet Service Providers Association and Wireless Communications Association International. 2017.

<sup>3</sup> Ibid.

The downside of rapidly improving fixed wireless technology, WISPs say, is that the WISPs have to make a decision about whether to “rip and replace” equipment every three to five years – a considerably shorter lifespan in comparison with landline options, which have lifespans in the range of 30 years.

### **Fixed Wireless Vs. FTTH**

Some WISPs have begun deploying fiber-to-the-home (FTTH) as a means of changing that dynamic. There are pros and cons to this approach.

Advantages of FTTH:

- Predictable market reach
- Longer life cycle (FTTH equipment depreciates at a rate that is four times slower than that of fixed wireless)
- Higher broadband speeds (as much as 10 times that of competitors)
- Lower churn (WISPs that have deployed FTTH state that churn is an order of magnitude lower with FTTH)
- Asset value (as much as two times that of a fixed wireless provider or more, per financiers, due to longer asset life)
- Avoids risk of government intervention in spectrum issues
- Avoids need to site and lease towers
- Fiber service is the most reliable service available and, unlike wireless options, is not impacted by weather conditions
- Lower opex (fewer maintenance and service issues, FTTH providers don't have to roll a truck to move equipment when, for example, a tree grows up or a new structure is built or when an unlicensed spectrum band becomes too crowded)

Cons:

- Fixed wireless has a faster ROI than FTTH
- FTTH may entail somewhat more permitting and right of way issues, although those issues arise with both technologies
- Longer deployment time (by as much as a factor of 12)
- FTTH requires heavy machinery that typically isn't required for fixed wireless
- FTTH deployment is weather-dependent (trenches can't be dug when ground is frozen or extremely muddy)

### **Different deployment scenarios favor FTTH, fixed wireless**

WISPs may encounter at least four types of deployment scenarios, some of which may be better suited to FTTH and some of which may be better suited to fixed wireless:

1. Rural cities with populations between 5,000 and 22,000 which generally have incumbent telco and cable internet providers. These currently are not good candidates for WISP deployments (unless the telco is one that offers low broadband speeds even in these more populous rural areas) but might merit FTTH deployments in the future.

2. Villages and small incorporated areas with populations below 5,000, which may have one or two competitive providers. May be well suited to high-capacity fixed wireless, especially if there is a water

tower that can be used for the access point. But FTTH may be an option if the village is larger or spread out, is relatively densely populated and if competitors have not upgraded their networks.

3. Winding rural routes with varying population density, which generally have low-speed DSL and do not have cable. A poor wireless environment that may be more suited to FTTH if average population density is in the range of 20 houses per mile.

	Rural Cities	Small Villages	Rural Areas	Farming Community
<b>Population (up to)</b>	22,000	5,000	500	200
<b>Telco DSL</b>	YES	YES	YES	YES
<b>Cable Service</b>	YES	YES	NO	NO
<b>Water Tower or Silo</b>	N/A	YES	YES	YES
<b>Population Density</b>	N/A	>20 homes per sq. mile	@ 20 homes per sq. mile	<20 homes per sq. mile
<b>WISP - Wireless?</b>	<b>NO</b>	<b>YES</b>	<b>NO</b>	<b>YES</b>
<b>WISP - FTTH?</b>	<b>NO</b>	<b>MAYBE</b>	<b>YES</b>	<b>NO</b>

Figure 1 When to use Wireless vs. FTTH

4. Large flat agricultural parcels on a grid and with light foliage. Good candidate for unlicensed, high-capacity wireless if at least 10 houses can be served from a broadcasting location, particularly if the area has a grain silo or other tall structure that can be used for the access point (as many such areas do). Population density is insufficient for FTTH.

#### Should WISPs overbuild fixed wireless with FTTH?

If a WISP decides to deploy FTTH, the company generally will be better off pursuing areas they do not currently serve using fixed wireless, thereby avoiding cannibalization of their existing fixed wireless base. While currently served areas may yield a positive ROI, even with cannibalization, that ROI generally will not be as high as it would be for a greenfield deployment.

However, an over-build could make sense when a fixed wireless access point reaches or approaches capacity. Overbuilding with FTTH would enable the WISP to reach customers it couldn't before due to terrain, foliage issues, etc. The take rate could increase by as much as 30% as a result, and churn should decrease.

Caveat: Emergence of fixed wireless LTE in the citizens band radio service (CBRS) spectrum band (3550-3700 MHz) could tip the equation more toward fixed wireless. LTE technology is quite mature, having been deployed in both mobile and fixed configurations for several years, which means it benefits from excellent economies of scale. The CBRS band will open up a wider swath of spectrum in comparison with current options, thereby supporting greater bandwidth and/or capacity. Together, fixed LTE and CBRS could substantially improve fixed wireless economics. But how disruptive the CBRS band will be depends, in part, on the rules that the FCC finalizes for the spectrum band, which will determine how much of the spectrum is feasible for fixed wireless use.

#### Developments for the Future

Other developments that could impact the future of the WISP business include government funding programs and wireless carrier fixed wireless deployments.

Reforms to the Federal Communications Commission high-cost Universal Service Fund (USF) and the Connect America Fund (CAF) will pay a portion of the costs of bringing broadband to rural areas that cannot get service at speeds of at least 10 Mbps downstream and 1 Mbps upstream today. Carriers receiving funding will be required to build service at speeds of at least 25/3 Mbps or 10/1 Mbps, depending on population density and other factors.

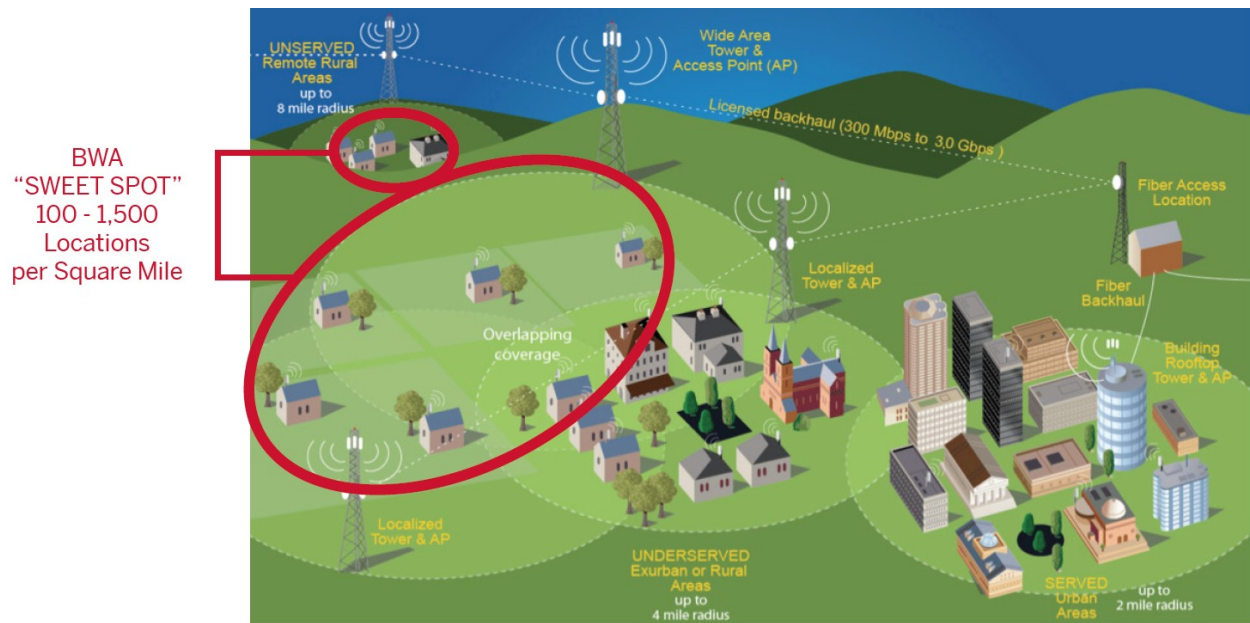


Figure 2 Source: *Broadband Wireless Access Industry Report 2017, The Carmel Group.*

This is both an opportunity and a threat for WISPs. As telcos upgrade service using USF and CAF funding, some are deploying speeds as high as 1 Gbps, making it more difficult to compete in those areas. But large nationwide incumbent carriers have declined funding for some areas, which means funding for those areas will be awarded through a reverse auction in which WISPs will be able to participate. WISPs might consider fixed wireless or FTTH for these deployments, depending on local conditions.

As for wireless carriers, some of the nation's largest mobile service providers are beginning to offer fixed wireless service, sometimes using 5G technology. Depending how widely these carriers deploy this technology, it could be a potential threat to the WISP business. Such companies are unlikely to be able to match WISPs in terms of local support, though. And WISPs may find that deploying FTTH (depending on conditions in a specific market) could be an excellent competitive response to large carrier fixed wireless deployments.

## Summary

Wireless internet service providers have played a key role in bringing broadband to rural areas using fixed wireless technology where faster speed options are not available from other service providers. Some WISPs are beginning to deploy FTTH, at least in certain areas.

Serving customers over FTTH has a range of benefits, including longer lifespan, higher speeds, lower churn, higher asset value, lower operational expenses and others. FTTH is particularly well suited to winding rural routes with an average population density in the range of 20 houses per mile and also may be an option in certain villages with populations below 5,000. It also may be a good idea for WISPs to deploy FTTH in an area that already has existing fixed wireless service when an access point reaches or approaches capacity.

In evaluating whether to deploy fixed wireless or FTTH, WISPs should consider the impact of new developments involving government-run funding programs such as USF/CAF, as well as fixed wireless deployments by large national wireless carriers.