Town of Middlefield

Communications Committee

Wireless Works

We hear a constant refrain from fiber advocates that “wireless doesn’t work” in the Hilltowns. What follows is an attempt to provide an objective context for these discussions based on the evolution of wireless technology, and three current examples of successful deployment in our region.

Wireless Technology is Evolving Rapidly

A number of attempts to provide wireless in rural/wooded towns have failed in the past. This does not prove that it can't be done. Any number of new technologies failed before the formula for success was found, or before the technology was actually ready. There are multiple reasons why it may have failed in the past, but can succeed now.

One is that the technology itself, and the products, have drastically improved. Modern wireless systems take advantage of Moore's Law and semiconductor technology advancements. They use modulation techniques and signal processing that weren't available a decade ago. So for instance a 2005 Canopy 900 MHz radio had 3 megabits per second of total speed, but its modern replacement gets ten times that in the same channel. Less-expensive radios on higher frequencies can go 200 megabits per second or more, and cover long distances, compared to earlier models that were simply outdoor Wi-Fi. It's a tool chest, and since 2010 it's as if we've moved from using a hammer and hacksaw to CNC (computer numerical control machines). In computer terms, it's like going from DOS 4.0 to Windows 10, in much less time. And the price of the equipment, being based on semiconductors, has also fallen severalfold.

The second is that the wireless internet service provider (WISP) industry itself has blossomed over the past ten years, and we thus know a lot more about what can and cannot be done, and how to do it. This isn't exactly rocket science, but it's highly specialized, and the early networks were cobbled together by people who had no experience, since it was such new technology. Now there are millions of people served by WISPs around the world, a very active trade group, a vendor support community, and experienced engineers and technicians who know how to do it right.

So it is not surprising that there have been failures in the past, but they don't prove that it can't be done now. (Contributed by Fred Goldstein, Interisle Consulting.)

Current Wireless Networks in the Hilltowns

We already have examples of wireless internet service providers in the hilltowns.

Hilltown Networks

Hilltown Networks provides high quality broadband Internet service in several communities including Ashfield, Buckland, Wendell, and New Salem. They are also actively working to provide service in Conway, Shelburne, Hawley, Charlemont and Colrain. As service expands, the list of communities will expand as well.

This Internet service is distributed from wireless access points to fixed locations. These access points are intentionally located to maximize network performance and customer access. The service is provided to the customer through relatively small wireless radios installed at the customer's service location. Hilltown Networks:

- Is a provider on the MassBroadband123 network,
- About 35% of their system which is now capable of at least 25/3 Mbps,
- Expects ~85% of the system to be at least 25/3 capable by the end of summer.

Royalston Broadband Network

The Royalston Broadband Network is an operational pilot employing 5 GHz & 2.4 GHz technologies in Royalston's South Village. It has about 40 customers, most of whom receive 20/5 Mbps service.

Warwick Broadband

In 2009, the Warwick Town Meeting voted to borrow $40,000 to begin Warwick Broadband, a town-owned enterprise tasked with providing wireless internet to Warwick residents. Over the past seven years, Warwick Broadband has built a wireless internet network that serves 180 households. The original loan was paid back from operating revenue, as promised, within three years.

Based on the network's history of success, the town almost unanimously approved the following at their May 2, 2016 annual town meeting:

> **Article 12 is a Borrowing article.** The motion will be in the amount of $240,000. A yes vote would allow the Town to borrow and appropriate it to Broadband capital outlay. The oldest and slowest ¾ of network electronics at both ends of radio links will be replaced, making the system five or ten times faster. Ten fifty foot tall poles acting as neighborhood mini towers are also funded. Repayment will be for five years from operating revenue.

The network will deploy dual slant 5 GHz and 900 GHz on their towers, and 2.4 GHz on the ten new poles. 75% of their customers will get an upgrade to at least 5 Mbps and most will obtain 25 Mbps or more. The ones they don't upgrade now already get 5-10. The loan will be paid back from operating revenue, with no effect on their tax rate.

Warwick has a 3.65 license and Cambium 320 WiMAX gear on two towers. While the customer radios are capped at 10 Mbps download, these are the best solution currently in place, and it is planned to keep them a few years more and then go to an LTE system to operate at 3.65, which is lightly licensed. At $25k per LTE access point the town will need grant support, which they hope to receive, given their track record of success.

Stephen E. Harris, Chair