



PLANNING AND IMPLEMENTING A WI-FI ZONE FOR YOUR TOWN:

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Why Create a Wi-Fi Zone?

Through both the Vermont Digital Economy Project and its predecessor, e-Vermont, we have worked to implement Wi-Fi zones and hotspots in 33 towns.

We helped downtown areas create public Wi-Fi zones for a number of reasons that revolve around economic development, including the ability to promote local businesses on a splash or landing page, the attractiveness of free Wi-Fi to tourists, the fact that having this kind of connection “signals” to outsiders that a town is forward thinking, and, finally, the opportunity for those who might otherwise not be able to have the internet at home (whether this is because there is no option for a fast connection, or whether they simply cannot afford one) to access the internet from a broad area.

You can read more about why a community might want a Wi-Fi zone in this article: [The Benefits of Public Internet Access](#)

How to Create a Wi-Fi zone:

The implementation of Wi-Fi zones in downtown areas was begun through the e-Vermont program, which used a model pioneered in Woodstock Vermont to create Wi-Fi zones in 7 Vermont towns. This service was in such high demand, that through the Vermont Digital Economy Project, another 16 Wi-Fi zones were created, along with 10 hotspots.

e-Vermont communities reviewed several options for how to provide Wi-Fi zones in downtown. At the time three main models existed in Vermont:

- Wireless zones created by a Wireless Internet Service Provider - [Great Auk Wireless](#) (GAW) has set up several of these zones, including in e-Vermont Community Newport.
- Wireless zones set up by a company that use existing Internet Service Providers - [Summit Technologies](#) has established these zones in places such as the Burlington International Airport and rest areas along the Interstate.
- Wireless zones set up by local volunteers as a "Do It Yourself" model - [Wireless Woodstock](#) provided the model for this approach in e-Vermont.

e-Vermont followed the “Do it Yourself” model, as did the Vermont Digital Economy Project. This is what is described below.

While more intensive, this approach ensures that a community fully backs the project, and by incorporating more voices into the project, more individuals know about it, understand it, and begin to support it. It is also usually cheaper, though it is most successful when there is a dedicated coordinator who can manage the process.

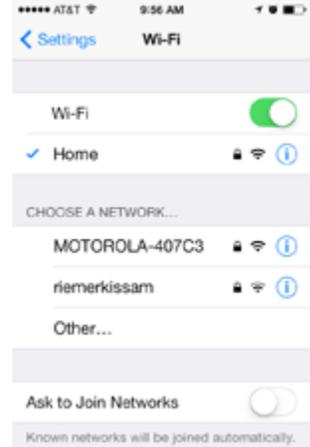


Step 1: Understanding what a Wi-Fi zone is.

What is Wi-Fi?

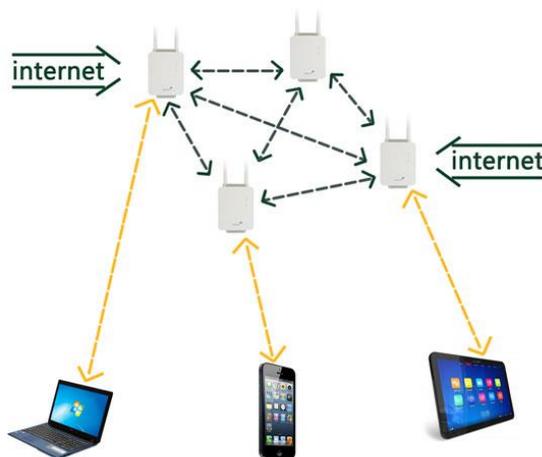


Wi-Fi is “a popular technology that allows an electronic device to exchange data or connect to the internet wirelessly using radio waves.” It uses the same technology that is in a simple radio to project the internet, which can then be collected by any device that has a Wi-Fi receiver (such as a smart phone, computer, or tablet.) It is a way to get and transmit internet wirelessly using short-range radio-waves, which is different from the cellular data plans you can get on your mobile device (3G, 4G, LTE). Wi-Fi is shorter range and is connected to a local router that is plugged in to internet from a cable or DSL connection, whereas data comes from larger transmission towers.



From a user’s perspective, most smart phone users have limits on the amount of data they can download on their phones, and to use it, they need to be within range of a tower (which can be challenging in some rural areas). Often, given the choice between joining a free local Wi-Fi network or using up data (which they pay for), users will opt for the free Wi-Fi. Currently, data plans can be expensive!

Meshing: the Difference between a Wi-Fi zone and a Wi-Fi hotspot



Most home Wi-Fi systems come out of one router. This Wi-Fi can be referred to as a hotspot. As you walk around your house, the farther you get from your router, the lower the signal is. Some houses may have two routers, but when you select which network to connect to, you’ll see two different options for connection (one for each router). As you move from, say, the first floor to the second, if you have two routers, your computer will have to disconnect and reconnect to a new network. With a mesh system, on the other hand, several devices are installed which “talk to each other.” By using devices that mesh, we can create

a Wi-Fi zone, which is different from a hotspot primarily in the amount of area it covers.



To create a “wireless mesh” we install several pieces of hardware that talk to each other and serve to create a zone. They mesh with each other, meaning that as you walk through the zone, your smart phone or computer will pick up the signal from whatever hardware you are closest to without disconnecting from the one you are leaving behind and asking you to reconnect to a new area. The result is a larger area with very good signal throughout. If you’ve ever been to a hotel or an airport with Wi-Fi throughout the entire building, it is almost certainly created through a mesh network, with a number of devices “repeating” the signal between each other (and meshing) so that you can have a seamless experience.

Step 2: Understanding the equipment, and the necessary “hookups”

Hardware

Access Point

There are a number of different hardware options that we can use to create a “wireless mesh network” (which is how a Wi-Fi zone is put together.) When looking at equipment, you can search for “wireless mesh Access Points.” They are called Access Points because a user can access internet through them.

Because we were looking to install these devices outside, we were looking, in particular, for types of equipment that could withstand rain and both high and low temperatures. At the time of the Vermont Digital Economy Project, there were a number of options for these types of equipment, including (but not limited to):

- [Cisco](#) (the Aironet 1570)
- [Aerohive](#) (the AP170)
- [Aruba](#) (the MSr2000 and the MSR4000)
- [Ruckus](#) (the T300 series)
- [Meraki](#) (now owned by Cisco): we used the MR62.



Gateway

Most of the devices listed above function as both Gateways and Repeaters. A Gateway takes internet from a dedicated connection (it is plugged in, usually with a Power over Ethernet cable,) to a standard internet connection. For town Wi-Fi zones, a basic business level subscription is recommended. This connection is what brings Internet to the zone.

Repeater

Typically the same piece of hardware as a Gateway, Repeaters are not hardwired to the Internet. Rather, they extend the size of the Wi-Fi zone by repeating the Internet connection via one or more radios, and meshing with each other. One benefit of many of these systems is that these devices begin as gateways, but if the internet connection fails, they will automatically reconfigure into repeaters, taking a signal from another Gateway.

Software

Software is used for monitoring the zone and to ensure everything is working correctly. This software is also called a “cloud controller” because it resides on remote servers (the “cloud”) and can be accessed via the Internet from anywhere.

Controls

The Meraki system uses a proprietary cloud controller (known as a “dashboard”) to monitor the zone. The cloud controller is password protected, and can be accessed through any browser. The controller can:

- monitor access points:
See what the load on each access point is, and flag when there is any issue associated with that access point.
- track usage:
Delve down to individual IPs and see who is using what site, as well as how long each IP is on the network for. This means that it is possible to find and potentially block abusers of the free network. (For instance if a user is downloading illegal music, he/she can be kicked off or blocked completely from the network.) It also means that it is possible to see which sites are most popularly visited on the network. For example, is it used mostly for checking email, or for reading restaurant reviews?
- track number of clients:



This is helpful in monitoring when the busiest times of the day are. For example, you can see spikes during town festivals. It is also tracked per access point, so you can see how many people are connected to each individual access point.

- track speed:
See what the upload and download speed on the network is, as well as on each access point, and change it if necessary.
- track OS, manufacturers, clients:
See exactly what types of devices people on the network are using. If it is mostly phones, for instance, then maybe creating more responsive web design is in order for optimized usage.
- configure access control:
Change access to the network based on individual IPs, or by Access Point. There is even the option of creating a private network on a single Access Point that is completely separate from the public network. You can also set the network to time people off every thirty minutes, for example, so they have to log back in to continue using the free internet.
- administrate splash page, and user experience:
Create a splash page that makes each user agree to the terms and conditions of using the public internet. This page can also advertise those individuals or businesses who are donating bandwidth. It can redirect to whatever landing page is decided on. These landing pages often advertise the town, for instance: <http://wirelesswoodstock.org/>

From a user perspective:

Wireless Woodstock wireless woodstock

Welcome to Wireless Woodstock.

Your use of this site constitutes your knowledge of both the advantages and risks of using an open WiFi service.

You agree to respect the system and behave responsibly by not engaging in discourteous behavior or usurping unusual bandwidth.

Or, in nicer words:

This connection is cool. The speed is profound.
There's no reason to mooch or willingly hound,
A free service that is so carefully placed,
In a charming little town, community based.
I promise to refrain from malicious attacks.
I promise to respect this system and relax.
Anything I do with this service that is lame,
I absolve Wireless Woodstock, et al, of all blame.

Please send comments and feedback to feedback@wirelesswoodstock.com

Continue to the Internet

When a user wants to use the Wi-Fi zone, he first selects the zone from his list of networks. In our Vermont Digital Economy Towns, each zone is called “The [Town] Connection” (so, for example, in Bethel, the network is known as “the Bethel Connection.”) Once the user has selected the zone, he will see a splash page appear (this can be set from the cloud controller,) which he has to agree to in order to continue to the internet.



When he has agreed, he will be redirected either to a website set by the cloud controller, or back to the website he was attempting to reach.

For our landing pages, we used a template designed by Haystack Needle. You can find examples of it [here](#), [here](#), and [here](#).

Step 3: Incorporating the community

Necessary stakeholders in creating the zone include:

- Local business owners
- Local town or city government officials
- local downtown revitalization groups

The town must also designate a **Moderator** and a **Point Person**:

The Moderator will:

- Look after the Wi-Fi zone once it is up and running
- Moderate the zone, using the cloud software provided, to ensure there is no abuse of the free internet
- Be the first point of contact for community members with questions once the zone is live
- Be responsible for maintaining the zone, and moderating it through cloud-controller.

Monitoring the system can take as much or as little time as the monitor wants to put into it. With many towns, once the network is set up so that a few key sites or types of content are blocked, and a few security measures are put in place, the network can run by itself. In many towns, the monitor checks in weekly to make sure there is no abuse. Others who are more interested may choose to spend more time analyzing the network and adjusting the usage, but once it is set up, this isn't necessary. The network can be set up to email the monitor once a month with a report, and will also email if an Access Point goes down. This is when the monitor will need to check the problem and see whether the internet or power has gone down, and whether the Access Point needs to be restarted or if Meraki should be called.

The Point Person will:

- Connect with members within the town to gain input into best placement for the overall zone
- Gain permission from landlords, selectboards and town businesspeople for equipment placement on their buildings
 - **important note:** a successful way to create the network involves asking businesses to “donate” unused bandwidth, which is then used to give the wi-fi zone its internet.
- Address any concerns that the community might have about the project



- Be responsible for coordinating the process, creating a liaison between business owners and technicians

The Vermont Digital Economy Project delineated these responsibilities in a single sheet, which you can find [here](#).

It is also imperative to find a **technician/contractor**:

Both e-Vermont and the Vermont Digital Economy Project contracted with an experienced technician to survey the sites to determine best positions for the gateway and repeaters. For the Vermont Digital Economy Project, this was Justin McCoart, from [Up and Running Computer Services](#).

In e-Vermont, local electricians helped install the equipment. Ideally a contractor should have experience with wireless networking and the software necessary to test signal strength when conducting a site survey to plan the zone. For the Digital Economy Project, the same technician who did the site survey also did the installation.

Most electricians will have no problem with the simple wiring scheme, which requires very little power and can be fed by Power-Over-Ethernet (POE). However, they may not have proper materials and accessories in stock so we recommend ample notice and a preliminary tour of the buildings to be wired.

The point person in town works with the contractor to find best locations for the equipment, then with building owners for permission to place the equipment at these sites.

The Access Points are weatherproof. Because they are mounted high up and out of sight, there is minimal concern about vandalism.

Read more about incorporating the community into this process in the following articles:

- [Why It Takes a Community to Build a Wi-Fi Zone](#)
- [What a Wi-Fi Zone Means to One Vermont Town](#)
- [How Wi-Fi Brings Townspeople Together](#)

Step 4: Maintaining the Zone

Once the zone is up and running, it will require some ongoing maintenance. While this maintenance is minimal, it is important for the moderator to be comfortable with the process of troubleshooting access points, and adjusting controls on the cloud controller.

Some settings may need to be adjusted as the Wi-Fi zone continues and moderator(s) responds to public input. For example, e-Vermont zones were set with speeds fast enough to easily access information



online but not fast enough to compete with commercial subscriptions. Some towns required adjustments to reach that balance.

Most towns also set up a fund to save for equipment replacements, advertising the zone, and / or expanding the zone if demand grows. To find out more about the cost of a zone, read the following article: [How a Town can Maintain the Cost of a Wi-Fi zone](#)

Once the zone is completed, the Vermont Digital Economy Project created hand-off documents for everyone involved. Find an example of this document, [here](#).

Case Study: How Wi-Fi Zones are Being Used

Read about how the WI-Fi zones installed through the Project have worked in the articles below:

- [Wi-Fi Coverage Continues to Grow](#)
- [How Our Wi-Fi Zones Are Being Used](#)