

Using a home mesh to link to the world wide web.

Upgrade Your Home Internet with WiFi Mesh

By Mark Costlow, SWCP President

WiFi has become nearly ubiquitous in our lives. The invisible wireless communications it offers was mind-boggling science fiction only a few years ago, but now people are so dependent on it they will be visibly uncomfortable if told there is no WiFi in a home or office. It's the lifeblood of our phones, tablets, laptops, smartwatches, and TVs.

When it works, it's great. But if it's bad, it's horrible. Many would rather have no WiFi at all, than be teased with the 1- or 2-bar signal that dribbles out websites in fits and starts and won't stream a video no matter how much buffering.

There are 2 main causes of these problems: **range** and **interference**.

Range has to do the distance from you to the WiFi Access Point (AP). If you're too far away, or there are many obstructions, the signal will be too weak. Every wall, appliance, and heating duct between you and the AP degrades the signal. One naive solution is to increase the radio power in the AP. That can help, but remember that the signal from your device back to the AP has to clear the same obstacles. A strong signal to your phone

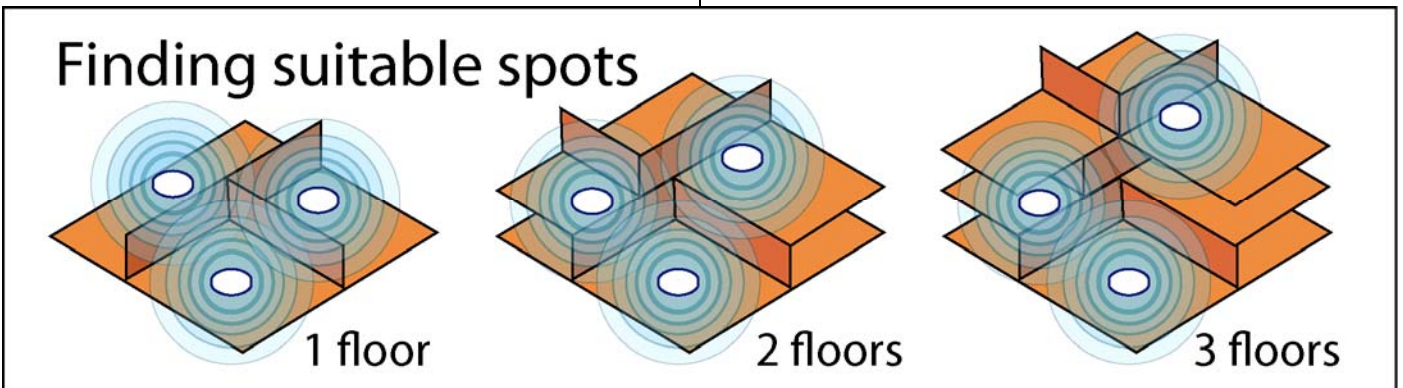
won't help if the AP can't hear the reply from your phone.

Homes with casitas or other outbuildings are particularly challenging, especially if you have thick adobe exterior walls or trees and bushes in the yard. Plants soak up many WiFi signals, especially the 2.4GHz variety.

WiFi is confined to a defined list of **radio channels** [<https://bit.ly/3479fW9>]. If too many transmitters talk at the same time on the same channels, the cacophony makes it impossible to tell good signals from bad. If you see 20 or 30 different WiFi networks available from your phone, interference is likely an issue. **The range problem contributes to the interference problem.** As people add more powerful APs for better range, they interfere with their neighbor's signals.

WiFi Mesh systems address both of these problems. Mesh systems have a central AP, connected to your Internet router. Then satellite APs (nodes) are placed in other parts of the house to give better, more localized, signals to devices in other rooms. The remote mesh nodes all connect to the internet through the central node. In the old days, you had to run Cat5 cabling from the central node to all the other nodes, but newer mesh systems allow all the remote nodes to communicate wirelessly themselves so all you need to place a remote node is a standard electrical socket.

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Modern mesh systems employ several strategies to provide a great signal throughout a large house:

- * They support more of the available **WiFi channels** [<https://bit.ly/3479fW9>] (in both 2.4GHz and 5GHz ranges), and dynamically adjust to pick the least crowded option. Since each node has multiple radios inside, the system can use different channels in different rooms.
- * The mesh nodes all communicate and work together. You don't have to configure them individually.
- * The WiFi support in most Internet routers does not get **updated frequently** [<https://bit.ly/3n229el>]. Independent WiFi systems support newer techniques and standards, and work better with newer phones, tablets, and PCs. Current Mesh systems support **MU-MIMO** [<https://bit.ly/3idVCTw>], **Beam Forming** [<https://bit.ly/33bL6hW>], and **Fast Roaming** [<https://bit.ly/3cE3bZe>] among other new tricks.

If you decide to get a mesh system there are a few good options. In general they all use a phone app to configure them, and the process is usually straight forward and easy.

There are systems with similar capabilities from **Google Nest** [<https://bit.ly/3igGXxz>], **Amazon Eero** [<https://bit.ly/36e5Rvv>], as well as **TP-Link** [<https://bit.ly/2GahNnh>], and others. At SWCP, we have the most experience with the TP-Link Deco. They come in 1-, 2-, or 3-packs. You can install as many as you think you need, and add more later if you want to extend coverage further. They set up quickly and have so far solved all the range and interference problems we have thrown at them.

Whatever specific system you choose, the important thing is that WiFi Mesh is a fundamentally new approach to providing a strong and stable WiFi signal throughout the whole house. But that is not the only major improvement coming to home WiFi.

WiFi Getting a Major Upgrade Soon

Along with this exciting new development, there will soon be much more WiFi available for home routers. The Federal Communications Commission has just recently opened up a new swath of the radio spectrum for unlicensed use. It's the biggest addition to WiFi since 1989.

Home routers already broadcast WiFi over several unlicensed ranges, 2.4GHz and 5GHz. This will add a section from the 6GHz band, which will open up a huge amount of useable frequencies for WiFi connections. How much?

For the past several decades, WiFi has been operating within chunks of spectrum that are only 400MHz wide. All WiFi-connected devices had to share that narrow band by means of individual channels. In this new space that has been freed, each channel can take up 160MHz. Only two such channels could fit in that range in the old scheme. Basically the space available has been quadrupled.

What this means is that WiFi signals will have less competition from each other, hence less interference, and therefore faster, more stable and reliable connections. Finally, WiFi should get somewhere near their advertized speeds. Smartphones using WiFi might even get speeds approaching those of top-band 5G.

Called **WiFi 6E** [<https://bit.ly/2GpAC5u>] just to be confusing, it is an extension of the latest standard, WiFi 6. There are a few catches, though. The higher the frequency, the greater the available speed, but always at the cost of shorter ranges and less ability to get through walls and trees. Mesh systems will continue to be a valuable tool to overcome these shortcomings.

There's also a small chance that WiFi 6E may slightly overlap or interfere with pre-existing 5G connections. And of course, it cannot go any faster than the speeds users can get through their broadband connection to SWCP or other providing ISPs.

The big catch, though, is that the new speed, is only available to new devices equipped for it – that is, the next generation. But chipmakers and other manufacturers are already getting prepared. Smartphones will likely come first, followed by routers, tablets, and TVs by 2021.

Be sure to remember to look for **"WiFi 6E"** on the packaging to make sure you will be getting the fastest speeds that you need.



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