NETWORKWORLD FROM IDG

THE ULTIMATE GUIDE TO HOME WI-FI

INSIDE

PRODUCT CHEAT SHEET
PAGE 2

TIPS & TRICKS
PAGE 4

EERO
PAGE 6

LUMA
PAGE 10

AMPLIFI HD
PAGE 13

ALMOND 3
PAGE 17

NETGEAR ORBI
PAGE 20

GOOGLE WIFI
PAGE 23

LINKSYS VELOP
PAGE 26

BY KEITH SHAW

The home Wi-Fi router market has been red-hot lately, with new entrants and old stand-by companies all promising features such as whole-home coverage, faster speeds, better parental control options and easier setup and management features. Even Google has gotten into the mesh space.

While readers of Network World have likely navigated the waters of setting up and maintaining a good home Wi-Fi system themselves for years, a large majority of people (the 99%) have likely had their own Wi-Fi system installed by their broadband provider, with nary a change to the network name or password (and it's probably written on a sticky note that's stuck to the fridge).

In this guide, we'll provide you with information about the new systems that are out there, our thoughts on some of the systems we've tested (reviews) and general advice on setting up and managing these systems.

THE ULTIMATE GUIDE

THE NEW WAVE OF HOME WI-FI SYSTEMS

PRODUCT CHEAT SHEET

Eero

TYPE: Wireless mesh

PRICE: $454.90 for 3-pack

COOL TOOL GRADE: ★★★★★

Luma

TYPE: Wireless mesh

PRICE: $294.46 for 3-pack

COOL TOOL GRADE: ★★★★☆

AmpliFi HD

TYPE: Wireless mesh

PRICE: $349

COOL TOOL GRADE: ★★★★½

Almond 3

TYPE: Wireless mesh

PRICE: $206.97 (for three units)

COOL TOOL GRADE: ★★★★½

SOURCE: EERO, LUMA, AMPLIFI, ALMOND

THE NEW WAVE OF HOME WI-FI SYSTEMS

PRODUCT CHEAT SHEET

Netgear Orbi

TYPE: Whole-home wireless (ROUTER & SATELLITE)

PRICE: $399.99

COOL TOOL GRADE: ★★★★½

Google Wifi

TYPE: Wireless mesh

PRICE: $299.99 for 3-pack

COOL TOOL GRADE: ★★★★☆

Linksys Velop

TYPE: Wireless mesh

PRICE: $499.97 for 3-pack

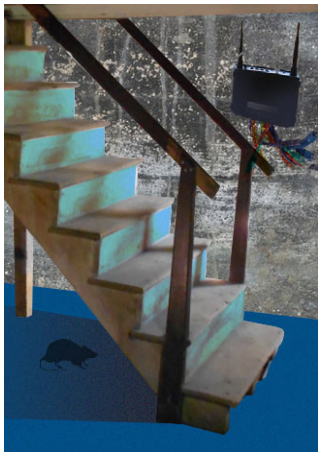
COOL TOOL GRADE: ★★★★½

*Prices based on Amazon.com, and are subject to change.

SOURCE: NETGEAR, GOOGLE, LINKSYS

Tips & tricks on new mesh Wi-Fi systems

BY KEITH SHAW



1 MOVE YOUR ROUTER OUT OF THE BASEMENT

One of the biggest problems with getting Wi-Fi coverage is that most people place their routers in out-of-the-way locations in the home. This includes the basement, or a closet, or wherever the broadband modem is located. Wi-Fi coverage in the home improves if the signal is higher up (on a table, bookcase or even mounted) and away from heavy walls/construction/floors. Most of the new wireless mesh systems are designed to fit in more with the décor of a living room or family room. Traditional routers, especially ones built for performance, are still large, UFO-like structures, but you should be willing to sacrifice interior design in order to get better Wi-Fi performance.

SOURCE: THINKSTOCK, STEPHEN SAUER

2 PLACE THE ROUTER NEAR THE BULK OF YOUR INTERNET ACTIVITY

Figure out what room in the house you're going to need most of your Internet access and place the Wi-Fi router there. Even if you move the router from the basement to the den, it's not going to help matters much if that's still 300 feet away from the TV, gaming console or other device. Wireless speeds and coverage decrease the farther away you go, so put the Wi-Fi router in the room you use most.

3 GIVE IT SOME SPACE

Even though we're saying to move the router to a new location such as a table or bookshelf, you still need to make sure that signals can reach the unit. We placed one mesh unit on an end table in our family room, and within a week there were additional headphones, remote controls, dirty dishes and books all stacked near or on top of the Wi-Fi unit. Not cool.

4 DON'T IGNORE ETHERNET

Even though wireless speeds have improved greatly over the years, it's still not as fast as a good, old-fashioned Ethernet cable. If you're going to be doing a lot of data transfers from a computer to a centralized storage device, Ethernet is the way to go. If your computer doesn't have Ethernet anymore, do those transfers right next to the Wi-Fi router.

5 CHANGE THE PASSWORD AND NETWORK NAME

Most of the new systems make it really easy to create new network names and passwords, so you shouldn't just use the ones that the broadband provider gives you, which is usually a jumbled bunch of letters and numbers. This forces you to write down the name and password on a sticky note, which is a big security no-no. Plus, naming a new network gives you a chance to let your creativity shine. Pick a favorite movie character or candy brand as your network name.

6 CREATE PROFILES FOR USERS /DEVICES

This is especially important if you have kids or multiple devices all competing for bandwidth at the same time. Setting up profiles will let you manage Internet access time (if you're looking to reduce that with kids), or set prioritization (so you can get that important phone call via VoIP at the same time your kids are online). Most of these new systems make it easy to identify devices using the network and set up the profiles, for either parental controls or traffic prioritization.

7 UPDATE FIRMWARE WHEN POSSIBLE

Many security vulnerabilities are being discovered on home routers because owners do the "set it and forget it" method of installation. New systems are getting much better at automatically updating their firmware when the networks aren't being used (such as overnight), but many systems still require a manual check for new updates. If you hear about a vulnerability, make sure the router's firmware is updated.

8 USE THE MOBILE APP

Most of the new Wi-Fi systems have moved management and administration from browser-based access to mobile device access. This gives the benefit of being able to check the network status when you're away from home (and try to fix things when you get that 2 am phone call from your spouse saying that the network is down when you're in Vegas at a trade show). The apps also include the new feature to instantly "pause the Internet" button to get your kids' attention, which is a lot easier to do from your phone than logging into your computer. ■

SOURCE: STEPHEN SAUER

Eero

Can a wireless mesh network solve your Wi-Fi coverage and speed issues in your home? Eero's easy-to-setup system make it worth a look.

BY KEITH SHAW

THIS REVIEW COVERS ANOTHER WIRELESS mesh system - this one from San Francisco-based startup eero. Like the Luma devices, the eero system comes in a three-pack of nodes (it costs about $460), but you can also buy individual nodes for about $190. You can get away with using just one node as its own Wi-Fi router/access point as long as you connect it to your modem (cable/DSL), but the added benefits of the mesh kick in when you add the second, third or any additional nodes. In the three-pack, the system includes power cables for each eero node, and one Ethernet cable that links the first node into your cable modem or WAN connection.

Setup starts with downloading the eero app, which walks you through the process. After connecting and confirming the connection of the first node (including naming the network's SSID and providing a WPA2 password), you can then add eero nodes to the network. The app isn't as specific as the Luma app in terms of where you place the additional nodes (Luma suggested going upstairs/downstairs as

SOURCE: EERO

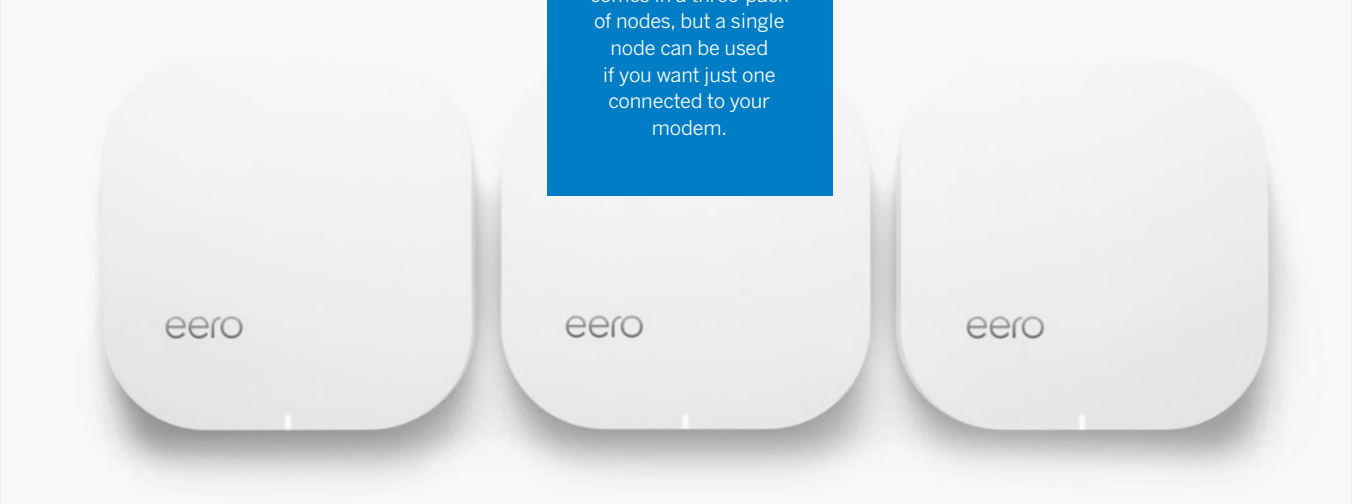
part of its setup), but the eero app does recommend a few things. First, it says the nodes should be about 40 feet apart from each other, which seems like a short distance. Second, it recommends that the units have line-of-sight placement, avoiding walls, doors and other obstructions. Good luck finding that in a normal house (I kept thinking that if I had an open-space house with direct-line of sight, I'd likely only need one Wi-Fi router in the first place).

In my tests, I placed the first unit next to the router on the left side of the house, the second unit in the dining room (somewhere in the middle), and the third unit on the right side of the house. They were all on the same level, and somewhat within line-of-sight (although I did have a door and some walls separating them). This approach in setup was different from my Luma setup, which placed one node on each floor of the three-level (two floors and a basement) house. When I placed the second and third eero nodes, I was warned that I had a "poor connection", but after hitting "Retry" (without actually changing the location of the node), the system connected properly. This felt like a weird glitch in the setup process than a situation where I had a poor connection.

The eero app provides basic information about the state of the network - whether it's online/offline, a speed test function (upload/download speeds of the WAN connection), IP addresses for each node on the network, and device names of things connected to the network (such as mobile phones, computers, etc.). You can also enable guest network access or ask for Help from eero (it provides the email address, phone number and a link for the Help Center). Advanced network settings can also be viewed, which lets you change your network from automatic IP addressing to static, or client IP addresses via DHCP being either static or automatic.

There's a 'family profiles' option as well, which attaches specific devices to family members (like your daughter's phone, son's tablet, etc.), and lets you set schedules for Internet access, as well as the manual pause feature, which "pauses the Internet" (just like the Luma system). It only lets you assign devices after they've connected to the network, so you need to build the network and have the clients attach to it before you can start the profiles.

Interestingly, the family profiles option was not available to me initially, as the system said it needed a software update for the eero devices in order for it to work. The software update was not something I could download, I had to wait up to 24 hours for the system to do



The eero system comes in a three-pack of nodes, but a single node can be used if you want just one connected to your modem.

SOURCE: EERO

an "automatic update" (in theory, it would update when the Internet wasn't being used by your family members), but it would have been nice to download the update myself (like you can with almost every other Internet-connected device on the planet). I did receive a nice email notification after the initial update, but still - let people update the system on their own or do it automatically during setup.

Once the three eero nodes were connected and working, the next part was connecting clients. In my case, this involved mobile devices (phones, tablets, etc.), as well as more static devices (a Wi-Fi printer, network-attached storage, Internet streaming devices and two game consoles). This was harder to achieve than the initial setup of the eero devices. To be fair, we also had some problems with the Luma system.

The eero app dashboard provides information on your home WAN speeds, and whether the internet is working.

Like the Luma nodes, the eero units provide an additional Ethernet port, in which you can attach other peripherals (storage, printers, etc.). For users who are switching from a single Wi-Fi system to mesh, this is the part where you're likely to run into some reconfiguration issues, as most singular Wi-Fi routers include up to three or four additional Ethernet LAN ports. If those were filled up like they were in my case, you have to figure out whether to split up the peripherals and attach them to individual eero devices, or attach an additional device to the one connected to the router (like a switch) and then attaching all of the peripherals to that device. Either way, there's the issue of IP address reconfiguration, power considerations and other fun networking tasks that could potentially ruin your weekend.

When I connected an Xbox 360 to the new network, I got a pop-up message from Microsoft saying that the system could detect multiple instances of the same SSID (while it only showed one option for the SSID name, we still got the message). This would seem to indicate that the mesh network nodes all transmit the same SSID name (instead of providing a 1, 2 or 3 to the initial SSID name), which the game console was detecting. The Xbox also gave a warning about our NAT settings and offered a port forwarding suggestion, but we were still able to connect the system without changing the settings. This issue is known to the eero support team, as the instructions for ports to open via the app are available on the eero site. The notebooks, phones, tablets, PS4 and Roku 3 Internet streaming box all connected to the new network without incident.

When plugged into the eero next to the router, a Seagate Central NAS box was able to be accessed from across the network, including connecting via the Seagate Media app on the Roku device.

Connecting the wireless printer (an EPSON XP-830 Series model) was slightly tricky. As mentioned before with the Xbox, the printer detected three different SSID options all with the same name. I selected the first instance of the SSID on the list, thinking that it would be the one with the strongest signal. After connecting, I received a warning from the printer stating that Multiple network names (SSID) that match your entered network name (SSID) have been detected. Confirm network name (SSID)." It also said, "A router/access point channel conflict has been

SOURCE: EERO

eero
GRADE
5 STARS
★★★★★

detected. If you have problems printing or scanning, improve your wireless network environment."

I had similar problems with the Luma system, which indicates that peripherals might not yet be ready for a wireless mesh setup. On the Luma devices, however, I had the additional problem of my notebook not being able to find the printer, despite both devices being on the same network. With the eero network, I couldn't replicate the problem, so at least I was able to print documents (but the issue of the multiple SSIDs still bugged me).

After running the eero network for a few days i didn't seem to encounter any connection problems with devices (although an Xbox 360 download did seem to take forever - but that could have been Microsoft's fault), and coverage around the house was quite nice (but I own a small house anyway so never had any major dead spots like other people might have).

BOTTOM LINE: Would I recommend switching from an existing Wi-Fi setup to one of these new mesh networks? The answer depends on a bunch of factors.

If you are finding yourself with poor connections, slow speeds or dead spots within your home, then these systems should be worth a look. They are a ton easier to setup and configure than trying to get a wireless range extender with a traditional Wi-Fi router.

If you're setting up a brand new network for yourself or a relative (or coworker or neighbor or someone who doesn't know or care about networking), then this is also a yes. The ease of use in terms of setup and the "set it and forget it" nature of these systems will impress you.

If you're an old-timer who likes tinkering with advanced settings, IP address configuration and other settings, I'd wait on getting these systems. Some "advanced features" are offered via the Luma and eero apps, but they're far less abundant than what you get when you access a traditional router via a web browser.

Finally, if you're happy with your current Wi-Fi setup, you don't need these either. While the 'pause the internet' feature and other features found on the apps are interesting improvements in managing a home Wi-Fi network, they're not worth having if it means you have to shut down your existing network, do the new setup and then reconfigure/reconnect your clients and peripherals (at least until a faster Wi-Fi protocol comes out). ■

SOURCE: LUMA

Luma

Luma's wireless mesh system changes the way you'll want to setup your home Wi-Fi network

BY KEITH SHAW

WIRELESS MESH NETWORKING has been around for many years with business-level products and services, but it's been pretty scarce in the home network space. The most famous user of a wireless mesh network (in which Wi-Fi clients talk to access nodes that can talk to other nodes, instead of a single router) is the wireless audio provider Sonos. But for the most part, improvements in Wi-Fi meant you still bought a singular router that you'd connect to a modem (or you have a combination modem/router given to you by your broadband provider). If you wanted to extend your network or improve coverage in parts of your house, you would need to buy a repeater/extender, which created an extra "hop" for network traffic (not optimal for services/apps that have a need for speed).

Two new wireless mesh companies have recently hit the market - Eero and Luma. Instead of a single router, these systems give you three smaller access nodes to create the mesh. One of the nodes is connected to the router, and then other nodes are

SOURCE: LUMA

placed in other areas of the house (similar to what you'd do with a repeater, but without the mesh).

We received samples of the Luma system - it's a 3-pack that costs about $300. Additional Luma nodes (if you have a really, really big house) cost $149 each.

Setup via app

Before you even connect the first Luma node to the modem/router, you download an app to your smartphone or tablet (iOS and Android supported). With the app, you create a Luma account, but then also provide information to the system - the name of the network (SSID), the password and the type of home you have. In our case, we set up for a three-floor house (two floors and a basement) - the app also lets you choose whether you live in an apartment or townhouse.

Next, the system asks where the modem/router is located, and then has you set up the first Luma node to the router, via a provided Ethernet cable. After a few minutes, the app tells you where to place the second Luma node (in our case, we headed to floor 2). Each node has two Ethernet ports (an Out port and an In port), as well as a power adapter. This means you need to place the Luma node near a power outlet.

Once your network is complete, the app provides a dashboard view that gives you the upload/download speed of the broadband network, and whether the network is up or down. There are also some other awesome features controlled through the app.

Best feature: Pausing the Internet

First, you can assign devices found on the network to individual users (the app calls them "People"). This is important, because it's required to enact my favorite feature - the "Pause Internet" button. With the press of a button, network access to the Internet is "paused" for any device that is assigned to a Person (luckily, devices not assigned to a person, such as a game console, TV or phone system, will continue to operate). If you have kids who are constantly using tablets, phones or other devices, this is the fastest way to get their attention. Users are also important for setting up filtering policies, which stops inappropriate content for younger users. It's based on movie ratings (R, PG-13, PG and G, or U for unrestricted access). You can assign a filter to the entire network or for individual users.

If you have guests over and want to give them access without revealing your Wi-Fi password, pressing the "Invite to Wi-Fi" button and send them a guest password via text message, email, or even AirDrop.

The system also has some security features - it will "continuously monitor your network to block hacks and malware by scanning the health of your connected devices for infections and vulnerabilities," Luma says. The system can also quarantine devices

SOURCE: LUMA

Luma
GRADE
4 STARS
★★★★☆

so they won't affect other devices on the network, and can even "work to fix the device with an over-the-air update when available." Alerts are sent to the Luma app when unknown devices are found on the network.

A few nitpicky things

For users who are experts at Wi-Fi router setup, the Luma system could be seen as "too simple". While the system supports 802.11a/b/g/n/ac clients (with simultaneous dual-band 2.4GHz and 5GHz frequencies), you can't set up separate networks like you can with more traditional routers. Security features supported include NAT, DHCP, PPPoE, VPN passthrough and IPv6, but those settings are invisible to the end user. Luma says that a future update will provide some more advanced configuration features for those interested. Most people won't likely care about this, since the goal for probably 95% of users will be network access and Wi-Fi coverage.

The single Ethernet Out port on each node will also likely cause some network re-adjustment if you have other Ethernet-enabled devices on the network. In our case, we had three additional devices connected to our older router - a network-attached storage device, a powerline adapter (to extend powerline networking to certain devices) and a backup storage device. With the three nodes each having one additional Ethernet port you could, in theory, move those other devices to the other nodes, or you could attach a switch to the first node (the one connected to the modem/router) and then go that route. It's not that hard to do, but just requires a bit more work. ■

SOURCE: LUMA

AmpliFi

Router-and-satellite system provides whole-house coverage, easy setup and tons of data to access

BY KEITH SHAW

NEW HOME WI-FI SYSTEMS BASED ON wireless mesh technologies keep coming out of the woodwork. That's a good thing, because being able to compare different systems, seeing what works and what doesn't, should spur innovation. While most people want a system that you just set up and forget (until the kids complain), I like having a system that you can tweak or obtain data from. But yeah, easy setup also makes it worthwhile.

Enter the AmpliFi wireless mesh system, courtesy of Ubiquiti Labs (the new consumer arm of Ubiquiti Networks). This system includes a cube-shaped router with two satellite units - vertical rectangles attached to a magnetic sphere with a power outlet (more on that later). The router includes an LED screen that displays data about your Wi-Fi network, as well as four Ethernet LAN ports and a USB port (reserved for later use). The company offers three models - the basic system ($199) includes a router and two satellites; the LR system ($299) stands for Super Long Range, and the HD system

SOURCE: UBIQUITI NETWORKS

($349) supports high-density environments. For this review, I tested the HD system.

Like most of these mesh-based systems, setup is done through an app you download to your smartphone or tablet (iOS and Android supported), but this system also adds the option to set up via a web browser. The router unit connects to a broadband modem, and then booting the system up lets you designate a Wi-Fi name (aka SSID) and password. After a few minutes, the system will let you know whether everything is working or not (luckily in our tests, it was). You could stop right there, as the router itself provides its own Wi-Fi coverage.

But of course, this being a mesh system, there are two additional units to set up - the satellite devices. The design of these is very cool - the top rectangular part features the antenna and an indication of your signal strength. The bottom part, which plugs into a power outlet, features a magnetic sphere that the top part connects to. This lets you rotate the top part in a different direction to obtain a better signal (in theory, you would point the satellite antenna towards the router).

This design does have a drawback, however. Clearly, these are designed to plug into a power outlet on a wall, which then lets you rotate the antenna to the left or right. In testing one of these satellite units, the only power available to me was on a power strip on the floor - not the most aesthetically pleasing setup option. The other two mesh systems I tested - from eero and Luma - offered units that would connect to power via a power cord, letting you place the units on an end table, cabinet or other location. It would be great to see an option from AmpliFi that lets you connect the satellites to a magnetic base station that then connects to an outlet via a power cord.

Like the router setup, connecting the satellites takes a few minutes - the satellites will beep once the network is correctly connected. I also had to do a firmware update for all three devices, but this was also handled through the app.

One other quick note - the design of the AmpliFi system suggests that you place the router in the middle of your house, with the two satellites on the opposite ends of the house (left and right). This then helps eliminate potential multi-hop slowdowns, which occurs when your network traffic needs to jump from one satellite to the other. The system does support multi-hop, I just found it interesting that the manual gave the warning about potential slowdowns if you install the router on one side of the house. In many cases (mine included), the broadband router is placed in a non-central location (one

The AmpliFi system includes a cube-shaped router with touch-screen display and two satellite devices that plug into wall outlets on opposite ends of your house.

SOURCE: UBIQUITI NETWORKS

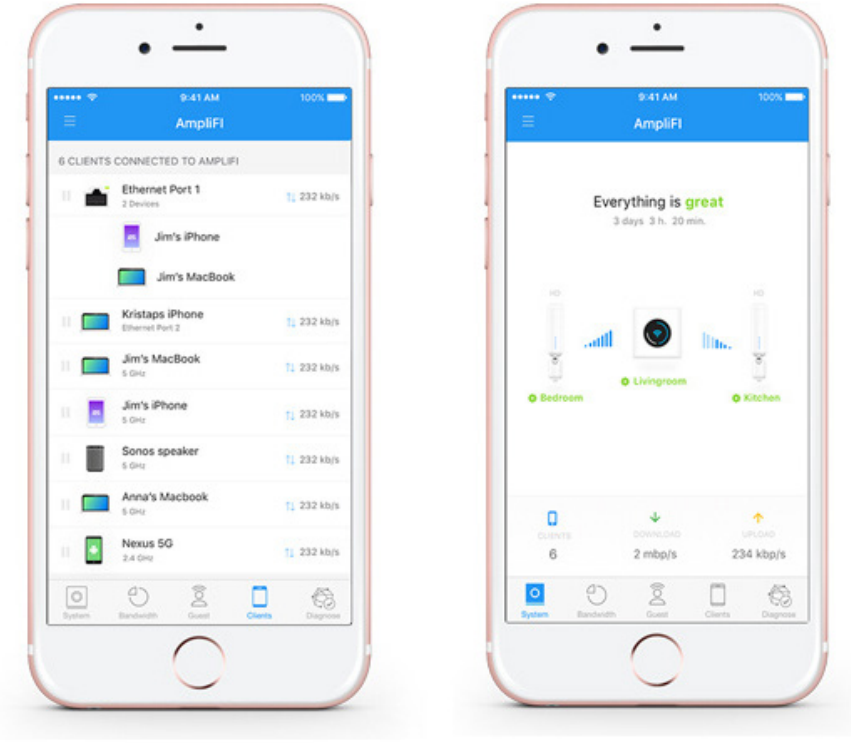
side of the house, basement, etc.), so if you want to avoid the multi-hop scenario, this could involve relocating the placement of your broadband modem in addition to the router.

Once the network is up and running, the router offers users many helpful data points. The screen is cute, giving you a clock and calendar so you'll always know what time and day it is. When you tap on the display, other screens appear, giving you information such as total data uploaded/downloaded, the IP addresses for your router and gateway, and real-time upload/download speed settings. On the app, a brightness setting for the displays includes the ability to turn on "Night Mode", which turns the display's lighting off at night (you can choose the start and end time for the lights going off). This can help if you're placing the router in a bedroom and don't want a bright blue glow to keep you awake.

Advanced settings for the router, accessed through the mobile app, include a DHCP server that lets you choose subnet settings, start and end points, and how long leases last for. You can also set up static leases, do port forwarding and clone the MAC address. You can even put the router into Bridge mode, change from DHCP to a PPoE or static network, if you so desire. It's encouraging that a mesh system gives advanced options like these, for those of us who like to have more advanced networks within our homes. On the wireless side, you can change wireless security (it defaults to WPA2 PSK, but you can drop that down to WPA or even offer no security, but why would you?), and enable a guest network for visitors to your lovely home. Advanced wireless features let you change the wireless channels on each frequency band.

The app also provides some fun settings that really let you dig into some cool options. For example, a Band Steering toggle tells the router to direct client devices to the 5GHz band for higher performance, with an automatic redirect to the 2.4GHz band if the device falls out of range of the 5GHz area. This option helps eliminate the need for creating two separate network name options, seen on other dual-band routers - the software does this all for you behind the scenes.

A Router Steering option is also very cool - this tells devices to connect directly to the router when possible instead of the satellite mesh points. This option is disabled by default, but some users may



The AmpliFi app provides a bunch of data, including connected devices and how the network is performing.

SOURCE: UBIQUITI NETWORKS

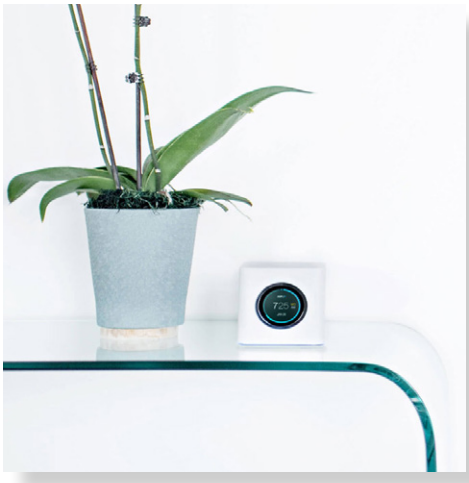
AmpliFi
GRADE
4.5 STARS
★★★★½

wish to enable this in case they are experiencing multi-hop slowdown. This would also likely help in smaller home setups (although in that case I'd probably just disable the wireless satellite anyway).

Other things you can do with the app - perform an Internet speed test (both upload and download) to see if your broadband provider is delivering the service you're paying for; and see a list of devices connected to your network, with an estimation of its own upload/download speeds. Identifying particular devices can be tricky, as this depends on the hostname of the client devices, which may or may not be changeable by users.

My favorite feature of 2016 is also available on the AmpliFi system - the "Pause the Internet" ability. Like the other Wi-Fi mesh systems I've tested, you can push a button and temporarily disable Internet access for all devices on the network, or for individual devices listed on the Devices menu. I like to call this one the "Get your Kids' Attention Really Fast Without Yelling" feature. Pausing the Internet through the devices menu eliminates the need for setting up separate profiles, which the other systems made me create. But then, you have to also know which device you're disabling - so make sure you press the right button so you're not disabling your spouse's tablet when you meant to disable your kid's phone.

Getting the system to work with my existing peripherals was not problematic at all. My wireless-enabled printer was able to print jobs, the game consoles quickly connected to the Internet and a network-attached storage drive could be easily accessed by computers, tablets and consoles alike. I liked having the option of four Ethernet ports on the router, which gives more options for devices like the NAS box and other network settings, something the one-port-only systems from Eero and Luma are missing.



Apart from the satellite units' design that makes it more difficult to place in non-wall outlet settings (such as power strips or setting them on a table), the AmpliFi system is a great mix of easy-to-setup networking with more advanced features and data that can help you figure out what's going on with your home network. I enthusiastically approve. ■

LAN transfer speed tests

File transfer speeds (unscientific) from three different locations at the Cool Tools testing house.

	Location 1 Next to router	Location 2 Middle of house, no line-of-sight	Location 3 End of house, with walls and obstacles
AmpliFi	6 min, 19 sec	8 min, 6 sec	6 min, 08 sec

SOURCE: UBIQUITI NETWORKS

Almond 3

Touchscreen router from Securifi adds mesh, smart home controls and Amazon Echo support

BY KEITH SHAW

If YOU'RE A FAN OF THE LITTLE GUY, one such company to root for is Securifi, which makes a really cool Wi-Fi router known as the Almond. The first version of this router came out in 2012, featuring a touch-screen display long before some other competitors added screens to their routers.

The latest version, Almond 3, has entered the wireless mesh arena, offering three Almond routers in a pack to let owners set up a mesh network in their homes as well as new smart home control options (including Amazon Echo integration). The company recently sent me a three-pack and a bunch of sensors to test out.

Each Almond unit is the same (no worrying about which one is the router and which one is the receiver). It's about the size of a small paperback

SOURCE: SECURIFI

book – imagine a toaster shrunk down to about a fourth of its size. Each unit includes an Ethernet WAN port and two Ethernet LAN ports, as well as a USB connection and power port.

Securifi gives you flexibility in how to set up the units. You can use all three units to set up a wireless mesh for greater coverage to help with wireless dead spots; or you could just set up one unit to the modem and use it as a stand-alone Wi-Fi router. A third option lets you connect an Almond unit to an existing Wi-Fi network, creating a Range Extender. I tested the wireless mesh option, since I was sent the three-pack.

The first Almond 3 unit you connect to your broadband modem becomes the "Prime Almond" – this is where you connect via Ethernet and then set up the wireless network via the unit's touchscreen display. In a brilliant display of forethought, Securifi includes a built-in plastic stylus on top of each unit, letting users navigate through the setup options with that instead of their fingers (which might pick the wrong option on such a small display). After choosing language and region settings, the Almond 3 will select its own Wi-Fi network name (SSID) and password, but you can easily choose your own by choosing the "Edit Wi-Fi settings" option. This method isn't as cool as the Starry Station, which can randomly generate SSIDs and passwords through its interface, but it gets the job done.

Because the Almond 3 is a dual-band Wi-Fi device (works on the 2.4GHz and 5 GHz frequencies), you can give separate names and passwords for each frequency, or you can keep them the same (if you have clients that can tell the difference). In my test, I chose a different name for the 5GHz network (to help see where coverage got weak).

After you've set up the first device, you can then download the Almond app (iOS and Android supported), which also requires that you set up an Almond account (it's free). The app provides a big range of features such as network status, IP address settings, MAC address settings and a list of devices that are connected to the network. The app is also where you can set up additional Almond units in other parts of your house. In theory you could set up additional units via the first unit and its display, but it's much easier to set up everything with the app. It was curious that the app didn't offer the ability to access an Internet speed test; this seems to be a default feature on most new routers/mesh networks.

Parental controls are handled only through scheduling of specific devices in terms of granting or blocking Internet access. Once a child's device connects to the network, the app lets you decide whether to grant them a "kids" or "Others" role, with the ability to then schedule when Internet access is given to that particular device. The schedule is a 7 by 24 grid with days of the week and one-hour blocks that toggle for either On (internet OK) or off (Internet blocked). I would have preferred a bit more

Real time monitoring with push notifications

Complete Control over your network devices

Easy parental controls. Schedule kids' screen time

SOURCE: SECURIFI

Almond 3

GRADE

4.5 STARS

granularity (like the ability to block from 6:30 pm to 7:45 pm, for example), as well as some app blocking (like block Netflix, but allow them to use educational apps). Like other systems that "Pause the Internet", you can do the same with Almond 3, but blocking is done on an individual basis by device, there's not one giant red button that pauses the Internet for everyone.

The other main appeal of the Almond 3 is its smart home controls. The router acts as a smart hub for many different detectors and sensors, with support for other smart home devices as well. In our test, we tested a Motion Detector, a door/window sensor, the Peanut smart plug and the Almond Click (a button that could act like a doorbell or other control). But it also works with other vendors' systems, including Nest, Philips Hue, GE, Belkin, and Kwikset, to name a few. If you've already invested in a bunch of smart home devices, you can monitor and control them through the Almond 3.

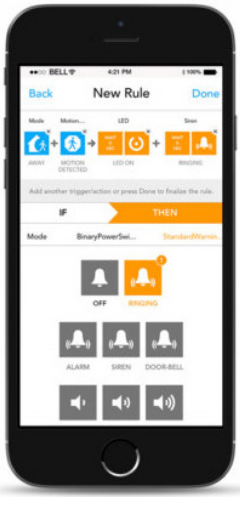
If you feel like going down the rabbit hole of home automation, you can start setting up rules and "scenes" that trigger based on certain scenarios and what kind of devices you have on the network. For example, you can create a rule that says to turn on a specific light if a device is on the network (each device can act as a presence sensor). Another example – if two devices are on the network (such as my phone and my wife's phone), then you can trigger a rule that sets the thermostat to a specific temperature setting.

These rules and settings also can be used to set up a home security system. The Almond app lets you set whether you're "home" or "away" (manually triggered, not through any geo-fencing or GPS presence), and then rules can be applied based on that setting. So, as another example – if you're away and the door sensor is triggered, the system can be told to play the siren on the Almond unit (each one has its own siren/alarm with volume settings), turn on the lights and send notifications to the smartphone user. This is getting deep into real nerdy territory, but it was nice to see that these options were available, and it also indicates how the home router could be the central hub for a lot of these devices (if we could all just agree on common protocols and simplifying it a lot more).

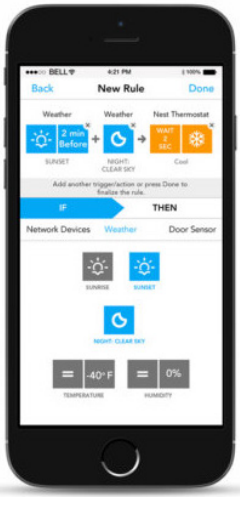
With the new version, Almond has enabled Amazon Echo integration, which then gives you voice control for several Almond functions (Securifi uses this example: "Alexa, tell Almond to turn off kids' Wi-Fi." In my test I didn't have access to an Amazon Echo, so I was unable to test this.

BOTTOM LINE: If you want to invest in a home Wi-Fi system that includes easy setup via touch-screen display, a mesh network that gives you whole-home coverage and a central hub that can control smart home devices, the Almond 3 deserves a spot at the top of your list. ■

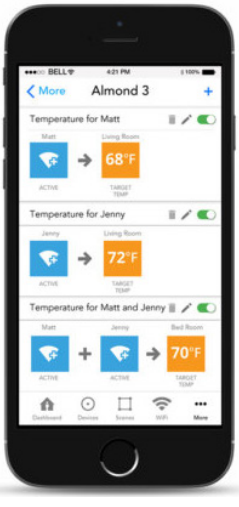
Multiple triggers and multiple actions



Use weather to automate your smart devices



Use Wi-Fi Presence to automate your home



SOURCE: SECURIFI

Orbi

Netgear system merges easy setup with access to advanced features, fast LAN performance

BY KEITH SHAW

THERE CONTINUES TO BE LOTS OF NEW products in the home Wi-Fi space. Vendors like eero, Ubiquiti Labs, Luma and Securifi have jumped into the wireless mesh space, taking on the notion of a traditional router and instead using smaller devices that can go into each room to provide better coverage.

Netgear, one of the leaders in the home Wi-Fi router market, has come out with a line of routers that aims to provide similar functionality, but does it in a more traditional sense. The Orbi system provides users with two devices – one that acts as a 'router' and one 'satellite' that then provides additional coverage within your house. The company sent me a two-pack to try out and review.

The first thing I noticed was that Netgear clearly labels which device is which. While both units look the same, one is marked "Router" and one is marked "Satellite", so you know which unit to connect to your broadband modem and which one goes somewhere else. With the mesh systems I've tried, it doesn't matter which unit connects to the modem – pick one and

SOURCE: NETGEAR

it becomes the 'router'. These units are also larger than traditional mesh units – the router and satellite units were slightly smaller than my Brita water pitcher, but about the same shape. If you are hoping to have units that blend in with the décor of your home, the size of these units may be surprising. In my case, I don't really care – I've lived with giant Wi-Fi routers in my home for the past 20 years, including ones with all of the antennas shooting out from each side.

Connecting the Orbi router to the broadband modem begins the setup process – Lights on the top of the unit blink for a few minutes, then the instructions tell you when it's OK to connect the satellite. Same thing there – plug in the satellite somewhere else in the house (it suggests somewhere in the center, but a lot depends on where you're modem and router unit are located) and wait for a signal from the satellite. If the satellite lights up blue, you're good; if it's amber or magenta, then you have to move it closer to the router.

Once the two units are installed, you connect to the pre-determined Wi-Fi network with your browser on a notebook, PC or mobile device. You can connect directly to Ethernet if you want, but I chose the wireless route. The browser then goes through more setup options, such as letting you rename the network and password. After that, the system then goes through a firmware update check (my system needed one) and then it confirms that there's an Internet connection. Both the router and satellite units have additional LAN ports (three on the router, four on the satellite), so adding additional devices to the network, such as a storage device, printer, or device that uses Ethernet, shouldn't be a problem.

One weird thing about this system – there's no dedicated Orbi mobile app. Instead, you need to download the Netgear Genie app, an existing mobile app for Netgear's other Wi-Fi routers. With Genie, you can then change things like the wireless settings, see a network map, monitor traffic and access parental controls (which requires an OpenDNS account).

This and the two-device setup makes the Orbi system feel more like a router/range extender option rather than a true wireless mesh. It was unclear whether you could buy an additional satellite unit to connect to the system. In theory, you wouldn't need one, since Netgear claims that its two-device system can cover homes up to 4,000 square feet (other mesh systems I tried needed their three units to cover up to 2,600 feet).

On the other hand, being able to access advanced network features is handled much better through browser-based access or the Netgear Genie app than with wireless mesh apps that often hide these features (if they have them at all). If you've been installing

SOURCE: NETGEAR

Netgear Orbi

GRADE
4.5 STARS
★★★★½

Wi-Fi routers on your own home network for years, you'll likely appreciate the ability to modify settings to your liking. Probably 95% of users won't touch these features, but it's still nice to have these options for network-heads who love tweaking this stuff.

Another big difference - Netgear's "Tri-band" system utilizes one of the two 5GHz frequency bands to create a dedicated channel between the router and satellite units. Netgear says this method gives you higher bandwidth (it uses about 1.7Gbps of that frequency band). Once you start adding more client devices to the system, this extra bandwidth will become extremely important, Netgear argues. In my tests, I didn't notice any Internet performance degradation (via the Ookla Speedtest app) when throwing a lot of traffic onto the network (multiple streaming video streams and other clients attempting to access the Internet), but I suspect that you'd need to generate a lot more Internet traffic in order to start seeing some issues (for most homes, the bottleneck is still at the broadband router, not the LAN).

When I did do some LAN tests (file transfer from a wireless notebook to a NAS box connected to the router), I did notice speed improvements with the Orbi compared to my existing wireless mesh network (The AmpliFI wireless mesh system from Ubiquiti Labs). I did file transfers from three different locations – right next to the router, right next to the satellite (or one of the AmpliFi nodes, relatively in the same area) and then in a neutral location (about one room away from the router, with some walls and other obstructions). In all cases, the Orbi was able to transfer files (A folder of multiple video files, about 2.42GB total) to the NAS faster:

To be fair to AmpliFi, there was some additional traffic on this network (some Netflix traffic and general Internet browsing from my kids' devices), but it wasn't enough to cause that much of a slowdown when compared to the Orbi. In general, if you're doing some large file transfers, the general rule to follow is a) transfer directly via Ethernet if possible or b) transfer in the same room as the router).

One other thing to note – Netgear has been around for many, many years. This isn't a dig against the other companies, which include many startups in this space – in my dealing with most of them, I've had fine customer service. But some people prefer to do business with companies with a long track record, and Netgear certainly qualifies here (your opinion may differ, of course).

BOTTOM LINE: If you have a complicated network setup that requires access to lots of advanced features that you're accustomed too, or if you're looking for some LAN speed boosts within your Wi-Fi space, Orbi is worth a look. ■

LAN transfer speed tests

File transfer speeds (unscientific) from three different locations at the Cool Tools testing house.

	Location 1 Next to router	Location 2 Middle of house, no line-of-sight	Location 3 End of house, with walls and obstacles
Orbi	3 min, 38 sec	6 min, 13 sec	5 min, 11 sec

Google Wifi

Easy setup, internet pausing and whole-home coverage among top features

BY KEITH SHAW

GOOGLE MADE A BUNCH OF NEW hardware announcements in 2016, which included new smartphones (the Pixel) and a virtual assistant (Google Home), but they also announced Google Wifi (love how they drop the hyphen and lowercase the F, causing whatever copy editors are left on the planet to wring their hands in anger), a wireless mesh platform to go up against the likes of other startups like eero, Almond, Luma, Amplifi, to name a few. Google Wifi is the update to its OnHub Wi-Fi platform - Google says that it's now on its third generation of products (the first one didn't make it to market, and the second one was OnHub). Google sent me a three-pack of the new system, (About $300 via Amazon, but also available from Best Buy, Walmart or directly from Google).

Like those other mesh units, the Google Wifi system consists of three equal small devices (Google calls them points). In order to create your network, you plug one of the points into a broadband modem via Ethernet cable (the three-pack comes with only

SOURCE: GOOGLE

The bottom of the Google Wifi unit has Ethernet ports

one cable) and power up the unit. Setup steps are done through the Google Wifi app on your smartphone or tablet (there's no way to set this up via computer web browser).

On the bottom of each point is space for the power cord and two Ethernet ports (see photo). One port is needed for the WAN connection from the modem; the second one can be used for other Ethernet devices (such as a storage drive, printer, etc.). Once the first point is connected, the Ethernet ports on the other ports act as LAN ports.

With the app, you set up the first point, renaming the name and password from its default settings to one that you like. The app will then guide you to set up the second and third points, testing both the mesh connectivity (is the point close enough to the other points) as well as configuring everything on the network side of things. The app can also test your broadband Internet speed – Google calls this the "Network Check".

Once your network is up and running, the app lets you set up a guest network, as well as create profiles for parental controls and devices (Google calls this section "Family Wi-Fi").

The Family Wi-Fi portion lets you create labels that can include one device (such as "Keith iPhone") or several devices ("Kids"). Once created, you can then pause Internet activity for those labels – even if you only create a group, you can still pause individual devices. You can also add an end time to the "pause", giving a time limit for when the pause will end. This includes one hour, two hours, four hours, "Until morning", or you can choose a custom time. This is a nice touch, as you might forget that you've paused the Internet, and don't want to deal with the request "Why doesn't the Internet work?" you get later.

Unfortunately, that's all you get to do in terms of parental controls. There's no whitelisting/blacklisting, or the ability to monitor/block specific apps or websites. There's no ability to schedule Internet on/off access either - it feels like this could be easily implemented in future app updates for Google (if anyone knows the Internet sites your kids are using, it's Google).

Google Wifi also lets you select one device to be the "priority device" – once you choose a device (a phone, laptop, gaming console), the system tells the other points to prioritize traffic to that device for the next hour. Other devices can still connect to the Wi-Fi network, but your prioritized device gets to enjoy better performance – like the FastPass at Disney World. It's an interesting way to provide QoS capabilities – via a time limit – other systems I've seen let you implement a permanent priority status, which can be problematic when the device doesn't utilize the network, it eats up the bandwidth that could be used for other devices.

The goal of the wireless mesh is meant for "whole-home coverage", giving Wi-Fi access to spots in your home where a traditional Wi-Fi router might not have reached before (or required the purchase of a repeater or range extender). However, this does not mean that your overall speeds will improve (compared with newer, faster Wi-Fi devices like MU-MIMO routers).

The Google Wifi points are AC1200 2x2 Wave 2 Wi-Fi, which offer less theoretical data transfer rates than AC1900 or AC3200-branded products. The system includes simultaneous dual-band (2.4 GHz and 5 GHz), supporting clients with 802.11a/b/g/n and ac.

Because Google doesn't let you create a separate 2.4 GHz or 5 GHz network, I couldn't do separate

SOURCE: NETWORK WORLD

Google Wi-Fi
GRADE
4 STARS
★★★★☆

speed tests based on the frequency I was utilizing. The Network Assist technology within Google Wifi gets to "make the best decision" about speed. For example, if it detects a lot of traffic on the 5GHz segment, it can auto-switch to the 2.4GHz section for each connection. For my tests, I assumed the traffic would travel over the 5 GHz frequency band, as there was no other client connected to the network, and no other traffic on my second segment (to reduce frequency interference, which Google would bypass anyway through its dynamic channel switching feature).

I ran three tests from three different locations in the Cool Tools Testing House – one next to the router, one in a second room about halfway through the house, and a third on the other end of the house. In each case, I was close to a Google point in the mesh, and I reconnected each time (turned off the Wi-Fi on the laptop, then reconnected), to be sure I was connected (in theory) to the closest node/point.

Other features

The app provides some network visibility – it provides a nice map of the devices connected, and also how much bandwidth each device is using. Another cool feature is that the app will display your Wi-Fi network password, in case you forget it or use one of those letter-number-symbol long passwords.

You can also designate other users as "Managers" to the network, which means they can help manage the system in case you're out of reach. Smart home options let you manage third-party devices (such as the Philips Hue light bulbs) if you have them. If you own a Google Home device, you can use the voice control systems to do things with the network, such as pausing the Internet.

Google says that it can also update the firmware on the devices automatically (usually overnight), but during my three days with the device I didn't receive any new updates.

There's not much here for gearheads - at least one page on the app lets you adjust some "advanced features" such as DNS, static IP addressing, DHCP IP reservations and port forwarding, but that's about it. You can't access the system via browser - when you do (if you know the IP address of the WiFi point connected to the modem, for example), you get a Google web page that tells you to download the app.

BOTTOM LINE: Google has provided a solid entry into the wireless mesh space for consumers looking to easily create a new wireless network within their homes, or to provide whole-home coverage in areas where older routers didn't reach. People looking for multi-device, high-performance routers should look for other products (within the MU-MIMO space). ■

Google Wifi speed tests

File transfer speeds (unscientific) from three different locations at the Cool Tools testing house.

	Location 1 Next to router	Location 2 Middle of house, no line-of-sight	Location 3 End of house, with walls and obstacles
Google Wifi*	83.83 Mbps	50.79 Mbps	35.27 Mbps

* Google uses simultaneous dual-band traffic, the user can't select whether traffic travels over the 2.4GHz or 5GHz frequency (the system chooses the best channel/path/frequency).

Velop

Good system performance, MU-MIMO support and easy setup highlights this Linksys home Wi-Fi package

BY KEITH SHAW

IT'S BEEN INTERESTING TO SEE HOW LONGTIME home wireless vendors have been approaching the new wireless mesh market, in which startup products like Eero, Luma, AmpliFi and Almond have hit the scene – in addition to Google, which doesn't qualify as a startup, but is new to the Wi-Fi market.

Companies like Netgear (with its Orbi product) and D-Link (with its recently announced Covr offering) have taken a hybrid approach – providing systems that deliver "whole-home coverage" but use a router-and-satellite framework, unlike the "three-pack" systems where each unit in the package is equal (at least until you connect the first one to act as the 'router').

Home wireless veteran Linksys (a division of Belkin) has taken the latter approach – its new Velop system is a three-pack of wireless nodes that promises "whole-home coverage" (up to 6,000 square feet) packaged in a very sleek offering. Like the other wireless mesh

SOURCE: LINKSYS

systems, setup is done via mobile app, and offers features such as easy guest network access setup, parental controls and some basic device prioritization. The company sent us a three-pack to try out and test in our unofficial "Cool Tools Testing Home".

Look and feel

Each Velop node is a rectangular column that looks more like a Bluetooth speaker system than the smaller, fatter wireless mesh nodes from other companies. The top of the unit contains a colored light to indicate whether the system is working or not, but other than that it's an all-white design. These systems are aimed to be part of a room's décor, so there's no giant antennas or other protrusions coming out of the Velop node.

In fact, Linksys has done a good job to attempt to minimize the number of cables that come from the unit. The cable connections (power, two Ethernet ports) all go into the recessed area on the bottom of the device, and Linksys has designed a flexible corner piece that clumps and holds the cables together. This gives the appearance of one cable coming out from the unit instead of two or more – you could even use cable ties to make it look less cluttered if you wanted. For the nodes that become part of the mesh away from the modem/router unit, you'll likely only have the power cable coming out from the bottom of the Velop node.

The Linksys Velop whole-home Wi-Fi system comes with three identical nodes. After connecting the first node to a broadband modem, the other two create a wireless mesh network.

Smooth setup via mobile app

Setup is handled through the Linksys app – having done some testing with other Linksys products, I already had a Linksys account. If you're new to the Linksys world, you need to set up a free account and then login to the app. The app took me straight to a section where it asked if I wanted to set up a Velop, possibly because it couldn't find any existing Linksys networks – there's also a link in case I was looking to install a separate Linksys product.

The setup process was similar to other mesh systems – step-by-step instructions on the app that were easy to follow, with confirmations on connections and locations along the way. The first node sets up next to the modem and acts as the 'router' – once that was configured I could move on to setting up nodes 2 and 3.

I did have one small hiccup while setting up Node 3 – the system couldn't locate it or it couldn't find one of the other nodes – I got an "oops" notification on the app, but then it succeeded on the second attempt. The system does take a few minutes to go through its processes of finding the other nodes, confirming that the placement is optimal and testing the mesh, but the app does a good job of letting you know what it's doing. It does take longer to set up a mesh network than with a standard Wi-Fi router, but it's not more difficult.

Speed testing

While the Velop utilizes dual-band frequencies for its network (2.4 GHz and 5 GHz), it does this in the

SOURCE: NETGEAR

The bottom of the Linksys Velop node includes two Ethernet ports, a power port and a reset button. The notch on the bottom right is a flexible area for better organizing the cables that come into the unit.

background – users don't need to create separate (or similar) names for those frequencies, like you would with other traditional routers. Instead, you create one name for the network and the Velop system decides in the background whether the data travels over the 2.4 GHz space or the 5 GHz space. My best guess is that this depends a lot on whether the client supports 5GHz, as well as the distance/signal strength of the client to the closest node.

This meant the speed tests we performed were only for the overall system in our three different locations, not for each frequency band. However, because the Velop supports MU-MIMO technology (where users can get a dedicated stream of traffic when multiple users are on the netework), we were able to perform a "multi-user" test as well.

These speeds were not as fast as some recent routers we've tried (the Netgear Nighthawk X10 and Linksys' own WRT3200ACM come to mind), but were still impressive nonetheless. The MU-MIMO test saw a slight dip in traffic rates (as expected), but were still very nice.

Mobile app and dashboard features

The Linksys app has a clean Dashboard view that lets you know if the Internet is working (a globe and a checkmark), how many devices are accessing the network, and then tabs/options for other features.

Clicking the "Wi-Fi" option/tab shows you the name and password (via asterisks) of your network. Clicking a 'Share' icon on the password part then shows you the password, which you can then also send via text message, email or copy to the mobile clipboard. The other three areas on the dashboard include options for enabling/disabling Guest Access, the Parental Controls section and the Device Prioritization section. Accessing other features, such as the Internet Speed Test, advanced settings, Notifications settings and Linksys Account section is done through the "hamburger tab" on the upper left section.

Linksys also does a good job at providing advanced features and options for more seasoned users via the app – I've seen many apps that try to strip away the advanced features in favor of an easy-to-use app. In the case of Linksys, the advanced features remain on the mobile app for more advanced users, but don't mess up the UI for the non-techie users.

Parental Controls

Having reviewed a bunch of other devices that specifically let parents control the types of content their kids are viewing (as well as setting time limits and other options), the parental controls option on the Linksys app was a bit disappointing. The controls are handled as such – you choose a device that has attached to the network and then type in a specific URL that you'd like to block (such as Facebook), or you can "Block Manually" which then turns off the Internet for the entire device. You can only block up to 10 sites via this method.

Being able to block category types (for example,

SOURCE: NETGEAR

Velop
GRADE
4.5 STARS
★★★★½

block all gambling sites), services or apps would be a nice feature to have. There's also no indication for user profiles – my kids access our network with many devices, so I'd have to control each device separately, rather than control via a user named "Kid#2". Blocking access via specific times (like between 7 pm and 8 pm ET) can only be done through the Linksys Web-based interface, not the app.

Device prioritization

If you have many users fighting for bandwidth at the same time, you might want to enable device prioritization, so your device can access the Internet when the kids are also trying to watch Netflix or stream YouTube (or, if you're being more noble, to let them do their homework while you're gaming).

The app lets you choose three devices to receive "priority usage" of your Internet connection. When you add a device to the list, the app runs a speed test of your system to determine how much bandwidth to save for that device, giving the leftover scraps to other devices on the network. There's no indication of how much bandwidth that is, whether it saves the bandwidth forever (like an unused reserved table at a fancy restaurant) on the off chance that the device pops onto the network, or whether it's first-come, first-serve until the device shows up. If it's the former (the reserved table scenario), then you'll likely have the 'have-nots' complaining about access during busy usage periods. In addition, any likely bandwidth bottlenecks will be at the Internet broadband part of the router, which the device prioritization doesn't address – this only prioritizes LAN traffic. It's like a carpool lane that ends five miles before the real backup starts.

BOTTOM LINE: I like the approach that Linksys is taking with Velop – provide customers who want a wireless mesh or whole-home coverage offering, but with the backing, knowledge and expertise that a wireless veteran is known for. In addition, it's good that Linksys isn't taking existing technology (like a centralized router and extenders) and slapping a 'whole-home coverage' label on it – these are brand new units that offer customers a different (and easier) approach to providing home wireless coverage. ■

LAN speed tests, Linksys Velop wireless mesh system

File transfer speeds (unscientific) from three different locations at the Cool Tools testing house. Test 1 was solo Macintosh doing transfers to a centralized NAS box connected via Ethernet to the Linksys Velop router. Test 2 was a MU-MIMO test, with three additional streams of traffic (Netflix via iPhone, YouTube via iMac browser, Roku box streaming video from NAS box).

	Location 1 Next to router	Location 2 Middle of house, no line-of-sight	Location 3 End of house, with walls and obstacles
Test 1 (solo)	78.77 Mbps	49.23 Mbps	32.38 Mbps
Test 2 (multi-stream)	72.24 Mbps	48.26 Mbps	30.99 Mbps