



Whole-Home Network 2.0: The Sea Change Continues

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Last year, a few startups began to deliver a new class of Wi-Fi system that gives everyday consumers what they've wanted all along: wireless routers that just worked. These systems:

- Are simple to set up,
- Are marketed in a language consumers understand,
- Keeps everyone's devices connected so they can do whatever they like, anywhere in the home, and
- Assume the burden of configuring, managing, and securing the network.

Few established manufacturers or industry experts understood that these new whole-home systems were about to turn the Wi-Fi router business on its head. But FeibusTech did. In a research brief entitled *The Coming Sea-Change in the Home Network*, published last fall, FeibusTech declared:

FeibusTech expects this new breed of router architected using a distributed model of Wi-Fi will spur market growth as it draws frustrated consumers off the sidelines and into the store to upgrade. As well, the consumer-friendly experience will convince Millennials and other first-time buyers to brave their first home-network installation.

With the benefit of hindsight, it's easy to see that things are playing out as forecasted. Whole-home Wi-Fi is outpacing suppliers' most optimistic forecasts. And suppliers tell FeibusTech that product returns are much lower than expected.

What may not be so clear, however, is that these systems are just the first step in the transformation of the home network. Indeed, the pressure for disruption has only just begun – and FeibusTech forecasts that it will begin to accelerate in the coming quarters. Here's what FeibusTech expects will be in store with what we're calling Whole-Home Network 2.0:

- Smart home integration – what if you want a Nest thermostat, but someone else's security cam? No worries. They'll work together. With each other. And with your home security panel.
- Voice assist – Smart speakers like the Amazon Echo and Google Home are wildly successful because, many times, it's easiest just to ask. Or tell. Even easier, when the network is ready to listen and respond wherever you are in the home.
- Lockdown security – the need for a sentry to monitor network privacy and security is growing with the number of connected devices in the home.

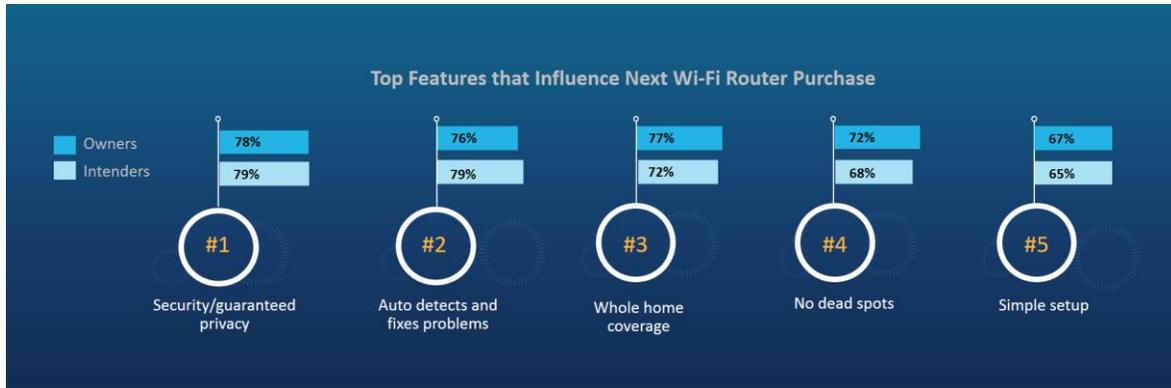
All of this is to say that consumers want their home network to just work – now and in the future. They expect new devices to connect seamlessly to the internet, and to other devices on the network. That's for new, smart thermostats, light bulbs, sprinkler systems and dishwashers as well as for phones, tablets, TVs and laptops.

To be sure, the disruption that mesh network systems are unleashing on the home router market has only just begun. FeibusTech believes that Whole-Home Network 2.0 will do far more than ensure smooth, safe and far-reaching Wi-Fi coverage. It will evolve into the hub for all the wirelessly connected devices in the home, whether via Wi-Fi, Bluetooth or ZigBee, or 802.15.4, a connectivity standard commonly found in home automation and security products. And, with the addition and refinement of voice assist, it will help us interact with all of it.



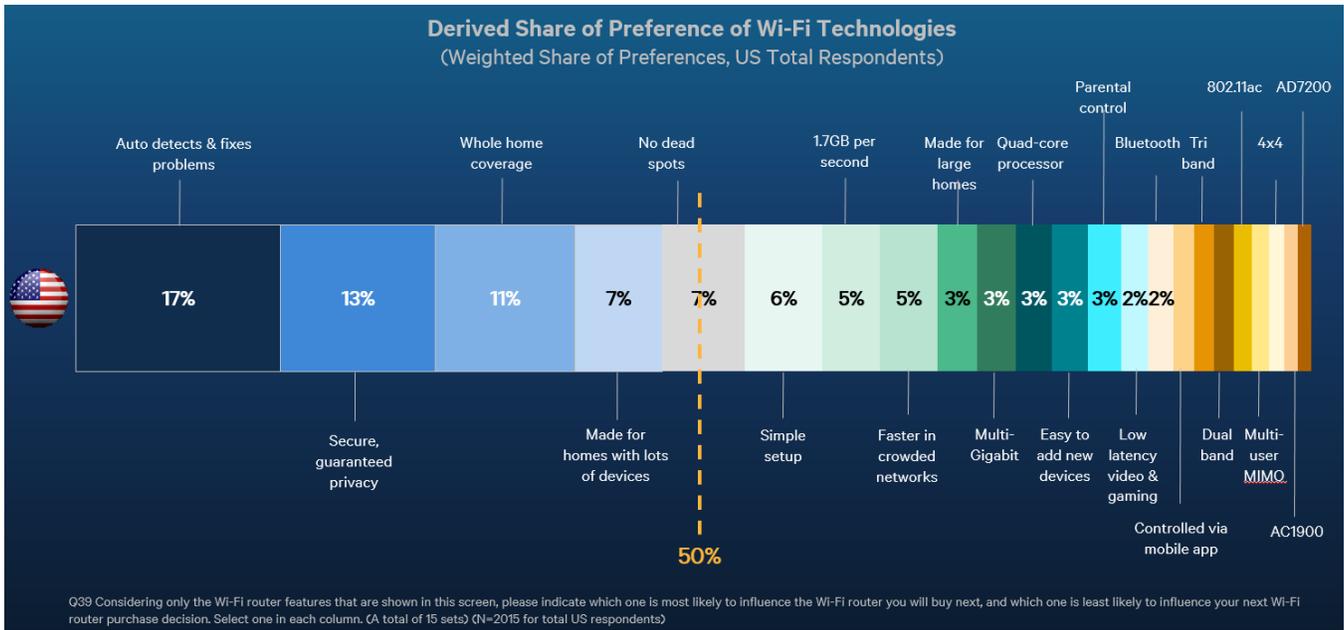
The home network has come a long way since the early days, when wireless routers connected a single device – typically a laptop PC – to the internet. Today’s networks are far more complex, with dozens of devices consuming orders of magnitude more data in every corner of the home. In addition, the emergence and rapidly rising popularity of streaming media content from Hulu, Netflix, YouTube and others is adding real-time demands to the mounting challenges of traffic management.

As well, wireless carriers have raised expectations, because they now deliver streaming content to consumers’ smartphones anywhere. So consumers now expect the same level of performance on their home network – with all their devices. (For more details on the changing home network, see our research brief, entitled [The Coming Sea-Change in the Home Network](#). And for more on what consumers want from home routers, see our e-book, entitled [What Consumers Want: Breaking Down the Sea-Change in Home Networking](#).)



From the FeibusTech e-book [What Consumers Want](#), an analysis of a comprehensive survey of more than 1,000 US consumers

Despite the evolving needs of consumers, home network suppliers continued developing Wi-Fi routers more or less as they always had: by boosting the theoretical bandwidth of a single connection at a given range. Those products sold well because consumers increasingly needed better routers to manage what they perceived to be ever-increasing throughput needs. Though they sold well, buyers were dissatisfied because these routers weren’t built to manage capacity for their now-crowded network of connected devices. Moreover, the product messaging confused some buyers, who delayed or even postponed purchases until their current router stopped working.



Things began to change early in 2016, when the first startups began offering home networking systems that catered directly to consumers’ needs. These new systems, today’s generation of Whole Home Network products, are simple to set up, offer whole-home Wi-Fi coverage and take on the burden of managing and securing the network without the need for human intervention.

The new whole-home networking category started to take off, which attracted new entrants. These included a few well-entrenched [router vendors](#) as well as some large, well-established connected home suppliers that were new to the home router market. By the end of the 2016, [the whole-home segment made up 21 percent of the home router market](#), up from virtually nothing a year earlier.

FeibusTech expects that sales of whole-home Wi-Fi systems will continue to mushroom, taking a majority share of revenue for consumer routers by year’s end. Part of that is because these systems fill such a need that consumers are willing to pay premium prices for them.

But FeibusTech does not expect suppliers to stand pat. Indeed, the networking market continues to expand and evolve, with new devices and new user interfaces. We also expect broadband carriers to add whole-home capabilities to their gateways, and offer optional satellites to add to the systems. And we expect the whole-home router segment to evolve along with it.



In five years, the GSMA forecasts that the typical family of four will have 50 connected devices in the home, more than twice what they have today. Some of those devices will play a role in the evolving smart home network, contributing information that family members as well as other devices may act upon. When sensors report that everyone has come home for the evening, for example, the door locks may activate. Or when devices detect that everyone has retired for the evening, the heater might drop the temperature a few degrees.

FeibusTech believes the home network will play a vital role in orchestrating the coordination between connected devices and each other, as well as between those devices and family members. To do that, Whole-Home Network 2.0 will need to deliver a new class of capabilities.

Specifically, it will need to incorporate additional networking technologies, so that devices communicating via unlike wireless protocols can connect. It will also need what FeibusTech calls “whole-home voice assist,” which would enable people to interact naturally with the network anywhere in the home.

And possibly most important, Whole-Home Network 2.0 will need to ensure all that communication is safe and private. Because the more useful and ubiquitous the connected home becomes, the greater the risk for exposure.

Whole-Home Voice Assist

Amazon launched the home voice assist category in late 2014 with Echo, the revolutionary smart speaker. Initially, the device was used primarily as a conduit to the internet: for weather reports, sports scores, the latest news and – naturally, given Amazon’s primary business as an online superstore – shopping. But increasingly, Alexa - the default wake word and voice of the Echo – acquired “skills” that let her adjust comfort controls, flip off the living-room lights and activate the alarm system.

Acceptance of the product – and the category – grew slowly but steadily, almost stealthily. As more consumers became accustomed to using the Echo, more connected home devices hopped on the bandwagon, giving Alexa the power to control more and more things in the home.

But as the potential for voice assist became more apparent with wider adoption, so too did its limitations.

For one, Alexa's ability to hear and respond was limited by where the Echo happened to be stationed. So, if the Echo was by the living room couch and out of earshot from the kitchen, then it was pointless to set a timer for when to put the lasagna in the oven. Likewise, few would bother trying to ask Alexa to add razor blades to the shopping list from the bathroom, while it was top of mind.

To try and minimize such spatial limitations and extend Alexa's reach, Amazon and others introduced smaller, portable and/or lower-cost smart speakers. Amazon introduced the Echo Dot, a diminutive, less expensive version of the original that is designed to expand Alexa's footprint. As well, Amazon released the Tap, a Portable Bluetooth Speaker with Alexa built in.

To be sure, Amazon is not the only one to make a play for the category. Microsoft, Samsung, Apple and others have all signaled intent to compete. The most prominent contender to emerge thus far is Google, which unveiled Google Home in late November 2016. The smart speaker features Google Assistant, the search giant's answer to Alexa.

This spring, Google announced it is tackling another major category limitation: the ability to discern different family members and respond to each differently, given their different preferences, interests and – perhaps most importantly – permissions. This is a very complex undertaking with many levels of recognition and decision-making sophistication that no doubt will be iterated for some time to come. It is also critical to widespread acceptance in the home, which means that Amazon and the others will all be addressing it as well.

Whole-home network systems typically include multiple nodes. Moreover, the nodes are designed to be attractive enough to be placed in plain sight – even in social spaces like the living room and kitchen. Which means there is an opportunity for them to help extend the reach of voice assist systems.

FeibusTech expects that Whole-Home Network 2.0 hardware will include microphone arrays, processing power and all the software hooks needed to support Amazon Alexa, Google Assistant as well as any other potential contender. This will prove to be an important feature in realizing the quest for what FeibusTech terms “whole-home voice assist.

Some OEMs may sell whole-home Wi-Fi systems preconfigured to support one platform or another. But the wise move, FeibusTech believes, will be to offer user-configurable voice assist, giving consumers the ability to choose whichever platform they prefer.

In the short term, some Whole-Home Network 2.0 systems may need to integrate speakers as well as microphone arrays in the nodes to facilitate not only listening capabilities for the voice assist system, but also response. The speakers add extra cost and may not be necessary in the long term, as connected speakers scattered throughout the home will help extend the voice assist system's ability to respond. FeibusTech expects that Whole-Home Network 2.0 will be adept enough to locate speakers within earshot of whichever microphone array is accepting commands.

Whole-Home Network 2.0: more than just Wi-Fi

FeibusTech expects that Whole-Home Network 2.0 systems will greatly expand the universe of hardware they can serve by integrating personal-area network technology – protocols like Bluetooth and ZigBee that are used to connect nearby devices to each other. As well, these systems increasingly will feature other whole-home networking technologies, like Powerline, to help extend coverage. These are all critically important to the realization of the smart home ideal, because the more and varied devices that can be connected to the network, the greater the value.

Take the previous example of voice assist. A nearby Bluetooth speaker could obviate the need for speaker hardware in whole-home router nodes. As well, a ZigBee hub built into Whole-Home Network 2.0 hardware would free consumers to buy smart lightbulbs at the best price without worrying about whether they might need to buy a hub as well. A Whole-Home Network 2.0 router would ensure that any smart bulb could be integrated.

FeibusTech expects that Whole-Home Network 2.0 systems will include support for Bluetooth and ZigBee initially, with integration of emerging and proprietary connected-home protocols like Z-Wave and Thread to come.

Privacy and Security

It is an absolute truth that the more connected devices installed in the home, the more potential entry points there are for cyberthieves to hack into the network. Further, the more devices we integrate into our daily lives, the more insight those devices will have to offer hackers about our personal lives.

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It must dedicate local, in-system computing resources to security. Those resources must profile every device on the network, and continuously monitor each device for anomalies in their behavior. It must have the ability to quarantine the devices that exhibit unusual activity.

It must have authentication securely rooted in hardware, so the system knows with certainty that when it listens to our voice, it can be sure it's genuine.

It also must be able to quarantine new additions to the network, unfamiliar devices that could prove to be malicious. And it must have a framework for layering in cloud security, to tap into the vast resources of large cybersecurity providers to ensure the system is always aware of the latest threats and fixes.

Whole-home network systems represent an evolution of the Wi-Fi router, a long-overdue upgrade with the capabilities needed to meet the demands of the modern home network. The few companies who are driving the innovation in the network, however, are not standing still. They are continuing to evolve network capabilities, with many more innovations to come.

And so FeibusTech expects that the whole-home network will stay a step ahead, and evolve as well. As this brief illustrates, Whole-Home Network 2.0 will need to lay the groundwork for the Connected Home. In particular, Whole-Home Network 2.0 will need:

Integrated voice assist to help make the rising technology more pervasive and useful,
New radios to pull personal-area networks like Bluetooth and ZigBee into the broader network,
and
Lockdown security to thwart cyberattacks and protect our privacy.

It took barely more than a year for whole-home network shipments to mushroom into a sizable piece of the overall home Wi-Fi router market. And the segment continues to gain steam. Whole Home 2.0 will carry not only the segment into the future, but the Connected Home as well.

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