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# How Upgrades to Distributed Wi-Fi Infrastructure Impacts IoT Technologies

By Cees Links

Indoor Wi-Fi infrastructure (for instance, in our home or in

the office) is undergoing continuous improvements as more connected devices enter the home, whether that be your smartphone and tablet or thermostat and refrigerator. This evolution has created significant challenges, though, especially as today's consumers expect data rates, capacity and range, all while having less tolerance for dead spots or interference from neighbors.

Among these three elements, capacity—multiple users using Wi-Fi at the same time—could be considered the most difficult challenge. Everybody has a router in their house, and every user is connected via the same Wi-Fi channel. This means users share the same bandwidth and raw data rate. Yet, if your son is playing online video games, your daughter is watching YouTube and your wife is in a video conference, you still expect to watch your on-demand movie without latency. These are the new Wi-Fi challenges RF technology must solve.



While repeaters (devices used to extend Wi-Fi signals) can be used, this does not resolve the issue. As bandwidth is shared even more, you communicate with the repeater on the same channel as your repeater connects with the router, effectively doubling the traffic on that same channel.

### **Distributed Wi-Fi**

There is a way of solving this issue. Wi-Fi mesh, also known as distributed Wi-Fi, can make dramatic improvements. With a distributed Wi-Fi infrastructure, every node on the network can talk on its own frequency band to the end user, while simultaneously communicating on other frequency bands with the main router, all while staying connected to the internet.

To put this in perspective, consider that the first version of Wi-Fi effectively used three channels (in the 2.4 GHz band) to avoid using the same channel as neighbors. Tomorrow, “modern Wi-Fi” (with .11ax) will use 40 MHz-wide channels and will effectively support many of those channels in the 2.4 GHz and the 5 GHz bands simultaneously, making it easier to stay away from the neighbors, and optimizing the usage in a home by enabling operators to have different channels via distributed Wi-Fi with multiple access points.

It doesn't end there. Distributed Wi-Fi provides capacity, and high-speed connectivity everywhere in the home. The secret to success is to use RF front-ends (RFFE), with the right filtering and power amplification technology to avoid interference, while maximizing output power and range.

Wi-Fi mesh will also impact IoT technologies in a positive way, and will be fully part of the smart-home infrastructure. Imagine having one discrete “pod” or device in every room, like Alexa or another voice assistant. Thanks to this new architecture, these pods can also be used as a relay system for other IoT technologies, such as Zigbee, Thread or Bluetooth. A simplified architecture allows IoT technologies to expand everywhere, while boosting the use of voice interaction and control. These pods must be low-power, energyefficient, small and discrete to be successful.

Each technology would then have its own purpose: Wi-Fi for content indoors (internet, emails, videos), Zigbee for the indoor sense and control network (energy management, security), and Bluetooth for connecting devices and personal appliances (like a smart watch), all supported by one infrastructure. Users will end up having no idea what technology they are using to reach the internet—it will just work!

And isn't this what everyone wants? Distributed or mesh Wi-Fi

has the ability to transform a house full of devices from loading screens to streaming and connecting flawlessly. With the imminent future of many IoT devices within everyone's home, this is exactly the Wi-Fi solution we need to increase data rates, range and capacity.

*Cees Links was the founder and CEO of GreenPeak Technologies, which is now part of Qorvo. Under his responsibility, the first wireless LANs were developed, ultimately becoming household technology integrated into PCs and notebooks. He also pioneered the development of access points, home networking routers, and hotspot base stations. He was involved in the establishment of the IEEE 802.11 standardization committee and the Wi-Fi Alliance. He was also instrumental in establishing the IEEE 802.15 standardization committee to become the basis for the Zigbee sense and control networking. Since GreenPeak was acquired by Qorvo, Cees has become the general manager of the Wireless Connectivity Business Unit in Qorvo. For more information, please visit [www.qorvo.com](http://www.qorvo.com).*



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