



infiNET Wireless Lighting Solution

Mesh network technology makes for the most robust wireless solution yet

Wireless communication is certainly not new, and, in fact, is quite pervasive in today's technology. From cell phones and PDAs to laptops and even lighting control, the cord was cut long ago. But we all know the problems with reliability, stability, and security associated with wireless systems. Integrators still prefer hardwired solutions to wireless for most critical systems such as lighting.

So when Zigbee technology came onto the scene, not many manufacturers seemed to notice. In environments saturated with wireless technology such as cell phones, cordless phones, and WiFi who needs yet another device clogging up the airwaves? For historical buildings and old homes with solid brick or plaster walls, trenching walls to pull control cables is messy, costly, time consuming, and often forbidden. For these applications wireless is the only solution; for other applications wireless solutions remain enticing, but only a dream. Perhaps now that dream is reality.

"We researched the wide array of wireless technologies, but none of them were reliable enough to build a multi-node, multi-path, professional-grade wireless architecture that would support an entire product line, until the introduction of mesh network technology," states Fred Bargetzi, VP of Technology at Crestron Electronics. "When we evaluated the advances in mesh network technology, we knew that it had all the elements we were looking for. It provided us with a robust RF data network foundation that actually enhances its communication network as devices are added to the system. Hence the creation of our infiNET™ product line." Crestron's infiNET line comes out of the gate with a complete line of products for retrofit dimming and switching solutions for residential lighting.

"Until now, there has never been a really good, high-end solution," notes Brad Ritchie, Cinemation. "Lutron and others have been around for some time, but you didn't feel secure about what would happen; you knew there was a strong potential for RF and communication problems." Mesh network technology is just more reliable and has a longer range than the existing equivalents due to its unique communication platform. Wireless mesh networks, such as Crestron's infiNET, are actually enhanced as the system grows, whereas traditional wireless systems use an ad hoc network design that requires the addition of strategically placed antennas, amplifiers, and repeaters.

"Historically, we've been limited to 32 zones. If we wanted to do more, we needed expensive processors and complex programming to handle it; we were limited in the number of master control stations and dimmer locations," states Brad Theiss, Automation Arts. "Operation for the end user slows down as you ask it to do more things." In a mesh network environment, every device acts as a repeater, providing multiple redundant signal paths to ensure consistent signal strength and stability for the entire network.

Crestron is one of the first manufacturers to embrace the technology. Crestron's infiNET technology utilizes an embedded 2.4 GHz RF wireless mesh network. Crestron leverages the bidirectional capabilities of the mesh network technology to offer more flexibility and increased functionality over traditional one-way RF communications. "Two-way feedback is key," exclaims Theiss, "you're not always going to know if lights or shades are at 10 percent or 85 percent, or if a scene is activated or not. Getting that feedback is essential." Using one-way RF systems, a scene may be active, but if any individual light is manually changed there is no way for the system to recognize the altered status, and no way to address that individual light to change it back. "If someone accidentally turns off a light, you couldn't turn it back on until the next day," recounts Theiss. "With infiNET you can know the status of each individual light and control it; you can even do conditional programming so that, when a scene is activated, the system can poll each device and put it in the correct state."

Interference and crosstalk is another issue associated with traditional RF wireless systems. A dropped network connection on your laptop or hearing someone else's crying infant on the baby monitor is annoying, but

interference in lighting and control systems is exponentially frustrating, even dangerous. Though some systems use spread spectrum, with the crowded RF spectrum there is still a high probability that the user will experience communication issues.

To help overcome the RF bandwidth saturation that is all too common, Crestron's infiNET mesh network lighting devices feature dynamic frequency allocation, ensuring that the system always operates on a free space on the RF spectrum. When RF interference is detected, Crestron infiNET devices automatically conduct a clear channel assessment, detecting any competing devices in the area and select an open channel. Whereas Zigbee's mesh network operates on three channels along the 2.4 GHz range, Crestron's infiNET scans all 16 channels on that bandwidth. According to Theiss, this is very important, "especially in MDU applications such as condos, apartment buildings, or even commercial offices, where other RF signals compete for bandwidth."

Another unique, professional-grade feature inside infiNET products is a built-in spectrum analyzer that allows integrators to run a real-time analysis to determine the RF energy in the area. The RF analysis is done from a laptop and can be done onsite or even from the integrator's office if the client has their Crestron system connected to the Internet. "This is not only a time and money saver," says Bargetzi, "but it really ensures the integrity of the system and its long-term performance."

Some integrators may be skeptical and stay with old wired systems, but Ritchie sites that, "unless you're dealing with a new construction, you probably don't have access to the dimmer locations. If you have a reliable wireless solution like infiNET, you can get into retrofits and old historic homes without having to break open solid brick or plaster walls." Ritchie estimates that using Crestron's mesh network lighting solution has "broadened the lighting control market from about 10-15 percent of jobs to 99 percent." Now lighting control can be offered to almost any customer regardless of the limitations of the structure of the home.

Crestron plans to grow and develop its infiNET product line to include other lighting control devices, thermostats, and motion detectors.

As technologies like these gain momentum, integrators will be able to offer affordable, reliable wireless solutions for retrofits installations. But don't throw your crimpers away just yet. ■

Field Tested: CRESTRON'S infiNET

A real-world review from Brian Jaworoski, Principle Owner, Cabling Technologies, Norwalk, CT



How easy is infiNET™ to install? How is it different to install than other RF systems?

Brian Jaworoski: The infiNET dimmers were relatively simple to install. It's as easy as installing a conventional dimmer or wall switch. My application was trying to retrofit an older pre-constructed house that did not use current wiring standards. The only challenge was identifying how the wiring was pre-installed so I could accommodate the master and slave dimmers.

Discuss stability and reliability.

BJ: The system has been installed and running for several weeks now without any glitches. I had some concerns since there are several wireless devices located around the house. In the past I have experienced the negative effects of other types of RF-based products in which cordless phones and WiFi networks had some serious impact on the system. I have not seen any interference or instability with infiNET — even with several WiFi access points, cordless phones, and other devices installed throughout the house.

What challenges did the technology help to overcome?

BJ: Since my house was constructed in the 1800s, the wiring and configuration of switches were quite different than a newer house that meets current standards. The infiNET system allowed me to control lights and scenes that would have required extensive demolition to the walls, since every location would need to be re-wired. We now have the ability to control lighting and scenes, as well as benefit from the time clock feature, which was all basically done in a matter of hours.

What features are particularly important to you?

BJ: The ability to dim a light from any location was at the top of my list. In a conventional two-switch application, one switch performed the dimming function while the other simply reversed the state of the light. Using this system you can raise and lower light levels from either location. The ability to control the lights using the internal time clock was also a key feature that my wife thought was the greatest thing. Now we do not need to check if someone left the back porch lights or the garage lights on — they will turn off automatically based on the scheduled time.

How would you rate the dimmers and the mesh network technology?

BJ: I definitely feel that the mesh technology is the way these systems will need to go to succeed. This was our second experience with mesh networks, and there are no complaints — it does what it is installed to do.

Does this solution open new opportunities for you or your customers?

BJ: Absolutely. Retrofit construction is 60 percent of our business. This adds a whole new option for functionality and control. Clients view this as a necessity, not a gadget.

How does this technology help you to grow your business?

BJ: We sell ourselves as a complete systems integration company for every application. Crestron's infiNET is one additional solution that completes that goal without boundaries. If I were to tell a client that we would need to tear apart his existing house to add wires to all the light switch boxes for control, they would most definitely say, "No." However, the infiNET wireless mesh network is going to be an important solution for a majority of our customers.

Do you plan to offer or spec infiNET dimmers in other jobs?

BJ: Absolutely. I would like to see some adjustments to the cosmetics of the devices, although I feel this is only a small limitation that will not affect our sales or installation of these products.

Would you use other infiNET products such as thermostat and volume controls, and motion detectors?

BJ: I can't wait. HVAC infiNET would be another phenomenal leap for retrofit applications. The less I have to say, "No we can't do that," the better our chances of becoming a true "system integrations contractor." ■