

Local Utility Gets High-Performance Wireless for Public Works, Public Safety and Public Access

To welcome and introduce new residents and businesses to Gaffney's rich history, vibrant arts scene, great shopping and enviable quality of life, the city has adopted the slogan "Get into Gaffney." The latest thing to get into Gaffney is a world-class, high-performance wireless network that addresses public works, public safety and public internet access applications.

Historically, the town evolved from its rural roots to become a textile center and is now a diverse and progressive city with a strong industrial base, tree-lined neighborhoods, and a thriving commercial district, all in a peaceful, small-town setting. The Gaffney Board of Public Works (BPW), the local customer-owned power, water and wastewater utility, is an active member of this thriving community. So when they decided to deploy a wireless network to address their own needs, they also considered how it could serve the whole community, including public safety personnel, government workers, residents, visitors and local businesses.

The Challenge

Like many cities, Gaffney investigated different ways to extend broadband wireless internet access throughout the community. An out-of-town internet service provider (ISP) even offered to provide free wireless internet service in the city's downtown area, if the city agreed to provide the ISP with free electrical service, attachment rights to city owned property and assistance in obtaining initial funding.

Meanwhile, the Gaffney BPW was looking for ways to better utilize their fiber infrastructure to extend broadband connectivity that would support their own needs and that of the community. They considered broadband over power line and point-to-multipoint wireless options before looking at wireless mesh technologies. After investigating offerings from some of the heavily marketed wireless mesh vendors, they became frustrated by the vendors' inability to provide the kind of high-performance solution that they were looking for. While BPW would be using the network primarily for high-speed data applications, they knew they needed to be able to support mission-critical public safety applications including real-time video surveillance as well as remote monitoring of video from police cars. Not only did the network need to be high-performance and mobile, it also needed to be reliable, resilient, able to provide separate and secure access for the different user groups, and able to prioritize traffic based on type or user.



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Ed Wallace,
Business Development
Manager,
AFL

The Solution

BPW's requirements for a robust, secure, QoS-enabled, high capacity, low latency network that could support high speed mobility led to discussions with AFL Network Services, a BelAir Networks reseller. As specialists in the installation, integration and support of fiber optic networks, AFL already had a long history and very strong working relationship with the utility and understood their need for a true carrier-grade broadband wireless solution. AFL also had extensive experience deploying BelAir Networks in a number of demanding environments including citywide networks, hotels and resorts and college campuses. As Chuck Bolin, IT Manager, Gaffney Board of Public Works explained: "We know a lot about fiber but not about wireless, so we've depended on AFL for that."

In fact, it was after visiting AFL's BelAir Networks deployment at the Davidson College campus in nearby Davidson, North Carolina, that BPW was convinced they had found the right wireless solution for their needs.

AFL Network Services listened carefully to understand BPW's wireless network requirements, both now and in the future and designed a solution that would be highly scalable and enable them to layer on multiple applications while maintaining the quality of the network. AFL provided BPW with a complete end-to-end solution from concept to design to deployment, including best of breed products, and their attention to detail and focus on efficient execution ensured a trouble-free deployment.

With their long history with BPW, their comprehensive knowledge of utility networks and experience with both fiber and high-performance wireless technology, AFL brings a unique skill set to utilities interested in wireless deployments. As Ed Wallace, Business Development Manager at AFL notes: "We've seen a trend recently, where utilities are spearheading wireless initiatives in municipalities because they also have rights to the poles, to the cabling, and fiber infrastructure around the city."

The Design

In Gaffney, AFL was able to take advantage of BelAir Networks comprehensive product family to design a high-performance network delivering both Wi-Fi and 4.9 GHz Public Safety access. The Gaffney wireless network is comprised of both award-winning quad radio BelAir200 and tri radio BelAir100T nodes.

Separate Wi-Fi SSIDs securely support both work order dispatches to mobile BPW personnel, as well as public internet access which is currently offered free. 4.9 GHz Public Safety access enables public safety personnel to take advantage of advanced networking capabilities in the field including streaming video, high-speed internet and database access, and transfers of large files such as maps, building layouts, medical files, and missing person images.

Both the Wi-Fi and 4.9 GHz traffic are transported over BelAir's patented switched mesh backhaul to an egress point on the utility's fiber network. As Joe Higgins, Senior Network Engineer, AFL Network Service explains: "The primary difference between BelAir Networks and anybody else's networks is the switched mesh -- there are no other manufacturers out there that provide a switched mesh."

Traditional mesh deployments use a 'shared' (or 'best efforts') mesh approach whereby only one backhaul radio is used to communicate with all of its neighboring nodes in the mesh. The total available bandwidth of the radio channel is 'shared' between all the neighboring nodes. The capacity of the channel is then further consumed by traffic being forwarded from one node to the next in the mesh -- reducing the end to end traffic that can be passed. Because bandwidth is shared among all nodes in the mesh, and because every link in the mesh uses additional capacity, this type of network offers relatively low end to end transmission rates and degrades in capacity when nodes are added to the mesh.

In BelAir's patented 'switched' wireless mesh architecture multiple radios communicate through dedicated mesh backhaul links to each neighboring node in the mesh. All of the available bandwidth of each separate radio channel is dedicated to the link to the neighboring node so the total available bandwidth is the sum of the bandwidth of each of the links. Each dedicated mesh link is on a separate channel, ensuring that forwarded traffic does not use any bandwidth from any other link in the mesh. As a result, a switched mesh is capable of much higher capacities and transmission rates than a shared mesh and grows in capacity as nodes are added to the mesh.

While many municipalities concentrate their initial wireless deployments only in their downtown core, focusing on the business development benefits of free or fee-based internet access as a primary driver for their network, with AFL's guidance, Gaffney took a different approach. Leveraging the network's ability to support mobile connectivity, the first phase of the Gaffney wireless network was deployed along busy traffic corridors connecting the downtown core to the I-85, the interstate running through the 'golden corridor' between Charlotte, North Carolina and Greenville, South Carolina. Nodes were also deployed in public areas including the city's beautiful parks, to provide wireless backhaul of real-time video footage from IP-based video security cameras used to deter, detect, investigate and prosecute crimes.

By deploying in high-traffic corridors and public spaces first, AFL and Gaffney BPW were able to immediately address the utility's needs while also providing valuable public access and public safety services. It also enables users in vehicles – whether they are BPW staff, public safety personnel, government workers, residents or visitors – to take advantage of seamless service continuity as they travel through the coverage area.

The Result

Gaffney is already being viewed as a role model for local utilities looking to deploy wireless networks. The end to end solution provided by AFL not only leverages BPW's installed fiber and pole rights, but also provides the utility with a high-capacity, reliable, scalable and cost-effective wireless network to address their own mobile applications while also securely supporting public safety personnel, public internet access and mobile government workers.

BPW is a part of the Gaffney community. Their Board of Commissioners is elected by the customers they serve. And, as Henry L. Jolly, Mayor of Gaffney notes: "The Gaffney Board of Public Works has been around for a long time and has a wonderful working relationship with the city. We know that everything we do, working together, is for the betterment of the community and I applaud their leadership in establishing this cutting-edge wireless network."



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To find out more, contact
BelAir Networks:
info@belairnetworks.com
sales@belairnetworks.com
1-877-BelAir1 (1-877-235-2471)
1-613-254-7070
www.belairnetworks.com

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