Ashton
TECHNOLOGY SOLUTIONS

From the woods to the World

Organizers of a festival in a remote rural location asked us to provide WiFi for everyone. Here's how we did it. By Justin Oaks

Laurel School, a private girls school in Cleveland, has been an Ashton client since 2012. In 2016, the school approached us with a challenge: to provide network infrastructure and continuous Internet service for Laurelive, an outdoor, weekend music festival at the school's Butler campus, a 140-acre, heavily wooded site in Novelty, Ohio, an exurb of Cleveland. This meant providing a secure network for dozens of vendors and a radio station, and another for the Geauga County emergency services team that would be on-site at all times. The organizers also wanted WiFi for the several thousand expected attendees. And with that many people, running temporary cable on the ground was not an option. We exceeded the school's expectations, and returned in 2017 for an even larger event.

Working with our partner Neletech, a provider of structured data cabling, wireless networking, security, and surveillance, we faced different sets of challenges on the north and south sides of the site (see map on page 3).

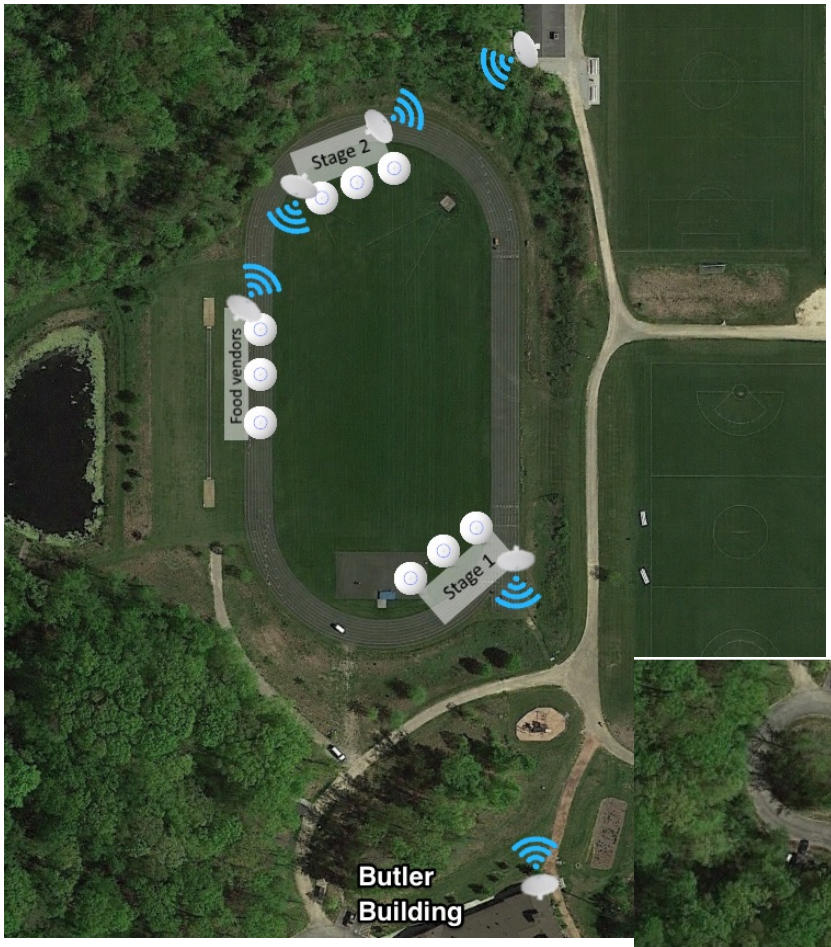
Ubiquiti Rocket AC

On the south side, we were able to use a Ubiquiti Rocket AC with a 60-degree antenna for point-to-multipoint connections with Ubiquiti NanoBeam ACs on the small third stage, tennis court, the main ticket gate, and a trailer owned by the event production company. Each NanoBeam was powered and connected by a Ubiquiti TOUGHSwitch, which also powered and connected Ubiquiti UniFi AC APs.

NanoBeams atop the box office.

On the north side, however, where the two main stages were, a Rocket AC wouldn't work. There were too many trees. So we used Ubiquiti NanoBeams for point-to-point connections. NanoBeams require clear line-of-sight alignment and the beam is easily obstructed — even, as we learned, by a few leaves. We had to trim some branches and tie down others. The management software on the NanoBeams allowed us to tweak the alignment for maximum signal strength.

The NanoBeams linked to more TOUGHSwitches at the stages and the main vendor tent, which connected and powered more APs installed high above the stages (in the rigging) and above the vendors. These APs provided service to the vendors who flanked the field and fans on the field between the two main stages.



Left: North side of the campus
Below: South side

Access point

Nano beam

WiFi signal

Left: Main stage under construction. This shot shows the distances and obstructions we were dealing with.

Below: A shot from behind one of the Nanos used for point-to-point connection. The receiving Nano is on top of the pole in the distance.

All of the access points have two bands, 2.4 and 5 GHz. The 2.4 GHz band travels through objects better, but is generally slower. The 5 GHz band is generally faster but more easily blocked by objects. Each band has a limited number of channels, which, if not carefully designed, will overlap and cause crosstalk, ruining wireless performance. It's important to use channels that don't overlap, like 1, 6 and 11 (2.4GHz band). Because each radio in an AP can communicate with only one device at a time, even at lighting-fast speeds, there are limits to how much access the AP can provide (see sidebar on page 5).

Ubiquiti's UniFi software, used to configure the access points and UniFi switches used in the wired core infrastructure, also allowed us to monitor the system in real time, and send alerts to our laptops and mobile devices during the festival. We were able to detect problems and fix them before anyone else even noticed. The day before the event began, one of the NanoBeams kept going offline. Later that night, we learned that the most recent firmware update contained some significant flaws, including duplicate broadcast and multicast traffic, switchport flapping, and other critical issues. Fortunately, Ubiquiti had just that day released a revised firmware to solve these issue. We updated everything again and had no issues.

Very late in the set-up, we learned that a large VIP tent would be placed in an area for which we hadn't provided coverage. Had we known about this tent, and a nearby vendor stand, we would have placed additional APs there, but there wasn't time. We bumped up the signal on the closest APs to the area. This slightly compromised our overall capacity as it overlapped with other APs, but there were no complaints as they were able to process payments.

APs were placed in custom-built, weatherproof boxes which were mounted to the towers holding the staging rigging.

Also late in the process, we were asked to provide WiFi specifically for the artists in the talent trailers parked behind the Butler building and to the changing/staging room in the basement. We quickly installed a few leftover APs in these areas and created a separate SSID and VLAN for this. Again, UniFi made this a cinch with its centralized management.

The Laurel School students and administrators who plan and staff Laurelive are rightly proud of their accomplishment and their campus. Providing WiFi for all attendees ensures that more people learn about the event, and the school, through social media posts. We at Ashton look forward to helping the school with this project as it grows.

Justin Oaks is a Systems Engineer at Ashton Technology Solutions, based in Cleveland, Ohio. Ashton helps clients leverage technology for lasting business results. Find out more at ashtonsolutions.com.

WiFi: The Classroom Analogy

If you're not familiar with how WiFi works, think of it like this: The access point is a teacher, the channel is a classroom, and each wireless device is a student. The teacher can only speak to one student at a time. If you add more students to the class, each one gets less time to speak with the teacher. You could add another teacher to the same room, but then the teacher-student conversations will overlap and everyone will have a harder time communicating. The solution, then, is to provide enough teachers (APs) and classrooms (channels) with enough space to ensure that all students (devices connecting to the network) get all their questions answered.