

## Tailgating Experience is Elevated with Advanced 5G Connectivity

Raycap designs, manufactures, and deploys one of the most complex 5G small cell pole networks in the nation, delivering 26 custom poles to a stadium's various parking lots ahead of major events.



### Overview

Midway through 2022, a large stadium in the USA asked its wireless integration and installation partner to create the infrastructure to support 5G wireless coverage for patrons outside the stadium. The installation had to be completed before several very high-profile events were scheduled to take place in early 2023, and there were only months left in which to accomplish the work.

The project would require replacing a subset of light poles in several of the stadium's on-site parking lots. The new poles had to mimic the existing poles and utilize the existing light fixtures. The engineered pole design would support various equipment configurations for multiple wireless carriers. The installation and integration partner reached out to Raycap, the only company with the resources and capabilities to satisfy all of the Stadium's technological, logistical, and scheduling requirements all at once.

Raycap worked with the partner to design, manufacture, and integrate the full solution. These multi-carrier poles were the most complex small cell poles Raycap had designed and fabricated to date and in order to meet the stakeholders' deadlines, they needed to be completed and shipped within record time.

### The Project

Like all other large modern venues, the stadium wanted patrons to have wireless connectivity available outside the stadium as well as within. Spending time with family and friends in the parking lot ahead of time has become a common ritual at every kind of event. Based on the stadium's general requirements for wireless coverage, all major carriers would need representation, and operational capacity had to ensure all stadium-goers would have connectivity at all times. Satisfying those concerns obliged the carriers to install a substantial amount of equipment somewhere in the stadium's parking lots.

But, allowing each major carrier to independently provide their own equipment infrastructure would risk cluttering the venue, creating a project management nightmare, and unacceptable delays. Instead, the stakeholders came together and worked out a plan to replace a select amount of existing light poles in the venue parking lots with 4G/5G small-cell poles. The new replacement poles would not only use the existing light fixtures but also each allow for the integration of every participating carriers' equipment. The equipment located at the top of the poles would be concealed in custom radomes that would not only protect it, but serve as a parking lot row designation, complete with decals.

It was difficult to specify a precise number of connections that would have to be supported, however, the order of magnitude could be extrapolated from other data points. This major stadium has a seating capacity of more than 60,000, and its on-site lots can accommodate upwards of 14,000 parking spaces. This suggests the likelihood of several thousand wireless users surfing, texting, and/or using voice or data all at the same time, at any given moment. Based on this data and the level of capacity needed to service that many devices, the stadium, and its integration partner determined that 26 poles replaced in the stadium's multiple lots would suffice.

## Fulfilling Project Requirements

Raycap owns and operates its manufacturing facilities within the United States and uses the most sophisticated manufacturing equipment in the world, including a plasma cutter that is one of the largest, if not the largest, in the industry. To accommodate the amount of equipment needed for the carriers, the pole design came in at 32 feet tall with a whopping 30-inch outside diameter, which exceeded the size limits of the plasma cutter. Having state-of-the-art equipment does not always allow for unique solutions but having craftsmen on staff does.

Raycap is one of the few companies left to retain the level of craftsmen that provides the company the ability to design and hand-cut custom doors, which it did. The venue stakeholders had a vision that included not only the aesthetics of the poles but the use of the existing four-arm light arrays. These light arrays had to be located on the very top of the poles, at the same height, and in the same orientation as the remaining parking lot poles.

Each of the carriers had its own requirements for the placement of the equipment both in and on the top of the pole. To further complicate the equipment placement challenges, each carrier owned licenses to different bands in the 4G/5G spectrum, which necessitated specific radio locations to accommodate various RAD centers.

The custom work also extended to the electronics. To protect the power coming into all the different radios on these small cell network nodes, Raycap needed to design an entirely new AC disconnect system. Every carrier is used to having a dedicated AC line for each of its cellular nodes, each with its own surge protection, power management, etc. Knowing from the start that these were going to be multi-carrier poles, it was more sensible to have a single AC line and a single AC disconnect per pole.

The site itself presented a separate challenge, as summer temperatures can commonly exceed 100° F. Cellular radios generate enough heat on their own to require cooling, and the environmental heat only adds to the potential stress. Raycap is uniquely qualified for this type of project, being able to conduct thorough, detailed thermal analyses, and having the engineering expertise to interpret the results and devise an effective technological approach ensuring proper ventilation and cooling where necessary. To protect the carriers' equipment, Raycap designed each pole with enough fans to protect the electronics – up to 28 fans per pole.



Figure 1. Raycap worked with the integration and installation partner to ensure all poles met both customer and carrier requirements.



Figure 2. Raycap's expertise made it the best choice for this concealed small cell pole project, overcoming a tight schedule, complex thermal designs, incorporation of existing light arrays, and designing a new multi-carrier AC disconnect.

## Summary

The stadium project was complex, the construction schedule was ambitious, and the stakes were high for the stadium, its sports and entertainment clients, and its suppliers. Raycap has its own US-based manufacturing facilities, complete with cutting-edge equipment and traditional craftsmanship. The company's sophisticated engineering capabilities, industry-leading thermal analysis technology and abundant experience with complex concealment designs contributed to the success of the project.

The only company having all the qualities needed to meet the stadium's project design challenges under tight deadlines was Raycap. Raycap's goal is to consistently meet and exceed its client's expectations from pre-sales, engineering, manufacturing, production, and after-sales service.

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