



## TerraWave Antennas Enable Wi-Fi / WLAN Connectivity in Front Sections of University of Nebraska's Memorial Stadium

### Executive Summary

#### Client:

CDW and the University of Nebraska

#### Client Challenge:

Provide strong network connectivity throughout Memorial Stadium to relieve cellular congestion and support enhanced game day experience using Wi-Fi.

#### Client Goals:

- Provide seamless network connectivity even in challenging areas of the stadium
- Protect, valuable access points from environment, theft and tampering
- Ensure cost-effective, reliable and easily-installed solutions throughout the stadium

#### Product Solutions:

##### Handrail and Guardrail Antennas

- Bring network connectivity close to the users in challenging areas
- Provide coverage and capacity for beamwidth-hungry apps to several rows
- Housed within rugged enclosures to withstand harsh weather conditions
- Fit within rails to meet ADA accessibility requirements



##### AP Enclosures

- Protect indoor Wi-Fi APs from harsh weather, theft and tampering



##### Universal Mounts

- Allow quick, easy enclosure installation
- Flexible for pole or wall mounting

The University of Nebraska's 85,000-seat Memorial Stadium is the proud home of the Cornhuskers, and some of the most loyal fans in the country. It boasts an astounding stadium sellout streak that dates back to November 3, 1962. But with today's generation of fans expecting network connectivity everywhere for their smartphones and other wireless devices, university administrators knew the stadium needed a major technology overhaul to keep them happy.

### Challenges

"The University wanted to ensure strong connectivity to the Wi-Fi network for all fans throughout the stadium. This would relieve cellular congestion and provide reliable service for voice, text, and data," says Paul Somers, Executive Account Manager for CDW, the information technology solution provider that was awarded the project. "They also wanted to provide a game day experience that fans can't get in their homes. With the advancements in home entertainment, the stadium needed to provide a new and exciting experience, one that's only available by attending the game. To help accomplish that, the university planned to roll out a new Huskers app that fans could download to their mobile devices that would allow them to enjoy video replays, multiple views of the field, and other custom video content available only by coming to the stadium."

### Solution

Working with Dan Floyd, Director of Information Technology for University of Nebraska Athletics, CDW's mobility Field Solution Architect, Martin Jerome and Project Manager, Dan Morris developed an RF coverage plan and a diagram of the stadium. It detailed the structure of the stadium, the location of the seats, boxes, load-bearing walls, and any concrete or other structures that might cause wireless interference.

To provide the coverage needed for a stadium full of users potentially connecting at once, CDW planned to install 800 Cisco access points to fill the stadium with Wi-Fi bandwidth. But Memorial Stadium has open areas that are difficult to reach because there are no structural overhangs for placement of antennas. For complete coverage and adequate capacity in those challenging areas, a different solution was needed.

### Innovative Rail Antennas Install Close to Users for Seamless Wi-Fi Connectivity

CDW enlisted the expertise of Ventev Wireless Infrastructure, the manufacturer of industry-leading TerraWave antennas, enclosures and accessories that support Cisco and other APs. TerraWave offers an entire portfolio of products and solutions designed specifically for use in high density environments like stadiums. TerraWave antennas and enclosures have been installed in many NFL, MLB, and college stadiums across the country and they are commonly selected to deploy and protect Wi-Fi access points. "We chose TerraWave for this project because of the quality of the products and the ease of doing business with them," says Somers. "From working with their research and development team to their sales team, they were all extremely helpful and 100% reliable."

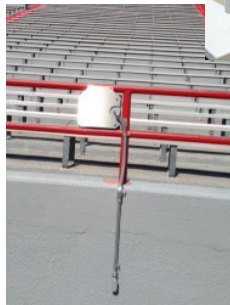
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## TerraWave Antennas Enable Wi-Fi / WLAN Connectivity in University of Nebraska's Memorial Stadium Front Sections



**Handrail Antenna**  
TESSCO No. 544382  
(Also available left-facing)



**Guardrail Antenna**  
TESSCO No. 517784

For Memorial Stadium, Ventev's engineers designed two, new TerraWave antennas housed within sturdy weatherproof enclosures to fit within the handrails and the guardrails of the stadium and bring network connectivity closer to the users.

### Handrail Antenna

The tiny Handrail Antenna fits most handrails. Secured within a compact, watertight polycarbonate enclosure, the antenna is a dual-band, 3 dBi directional antenna with a 60/90 degree beamwidth. The enclosure attaches to the handrail with a pipe mount and stainless steel fasteners and includes four, low-loss cables to connect to the access point. To install, a hole is cut into the rail and the cables are routed through it and under the concrete steps to the AP.

### Guardrail Antenna

The Guardrail Antenna consists of a dual-band, 3 dBi antenna housed within a slim but rugged, impact-resistant polycarbonate enclosure. The internal antenna is field-adjustable with a +/- 20 degree tilt for precise coverage. It installs easily to any guardrail with stainless steel fasteners. Four low-loss cables connect to the access point. To install, a hole is cut into the pole and the cables are routed through the pole and then down the wall inside of a conduit pipe to the AP.

Both antennas provide seamless Wi-Fi connectivity and capacity to users in several surrounding rows of the stadium. And, because the antennas are small enough to fit within the railings, they meet Americans with Disabilities Act (ADA) standards for accessible design.

CDW also chose TerraWave polycarbonate enclosures to protect the Cisco indoor access points from the environment, theft and tampering. "We've learned that TerraWave products do everything we need them to do," says Somers, "and they do it better than the others."

For questions and to purchase products, contact a regional account executive at 210-375-8482, 800-851-4965 or email: [sales@ventev.com](mailto:sales@ventev.com).

After testing a small quantity of the selected products, the entire solution was installed and tested again. The project was completed for the home opening game in August 2014. "Overall, the opening game went very well," says Somers. "The student body and fans were very pleased. When the stadium was filled with fans we learned of some areas that could use a little tweaking and immediately began work to upgrade them. We plan to continually assess and adjust access points as needed throughout the season to provide University of Nebraska fans with the best connectivity and experience possible."

*According to a recent update posted by the University of Nebraska, during the 2015 football season the high-density Wi-Fi network at the University of Nebraska's Memorial Stadium managed an average of 3.4 terabytes per game with two games going past the 4 TB mark.*

*The average number of unique devices connected per game was 31,358, an impressive "take rate" given that the average announced attendance during 2015 was 90,012 per game.*