

Vandal-Proof Antenna Supports System Reliability



TRAFFIC MANAGEMENT IMPROVED WITH REDUNDANT WIRELESS NETWORK

Today, large cities and metropolitan areas require Intelligent Transportation Systems (ITS) to manage traffic flow, reduce congestion, improve public safety communications, and support mass evacuation plans. In 2017, the New York City Department of Transportation (NYC DOT) needed to replace its aging wireless traffic management system due to poor performance, reliability issues, and an expiring frequency lease. The city chose a more robust system that utilized the FirstNet® mission-critical wireless LTE network to manage signalized traffic intersections in its five boroughs.

"We are part of the Band 14 FirstNet® system", said Thomas Kelly, Director of Electrical Operations, NYC DOT. "Every one of our traffic intersections is now attached to the system. We worked successfully with AT&T, PCTEL, Digi and other suppliers on this project to make that happen."



INTELLIGENT TRAFFIC MANAGEMENT SOLUTION

"With more than 13,000 equipment cabinets controlling traffic signals citywide, it wasn't cost-effective to change the cabinet at every intersection. We needed to retrofit the new components to fit the existing cabinets," stated Kelly. "The original system started out with a small-footprint antenna, and we needed to move to a very large-footprint antenna, which required a custom design."

Four Nines of Reliability

One of the new system goals was robust reliability with multiple wireless redundancies to improve system availability. Steve Mazur, Digi Business Development Director, explained how to achieve 99.99% availability to the intersections. "We had to ensure that while we're running on one link, if there's any trouble such as a slowdown, loss of signal, or the link somehow falters, we can quickly switch over to other available links."

The antenna is critical to sending and receiving a reliable signal from the network, said Kelly. "We needed to make sure that we had an antenna that could capture the cellular signals in any circumstance."

Rugged Antenna Requirements

Operating on the FirstNet and backup cellular systems required the new industrial-grade antenna to support seven different antennas in the same cabinet knockout. That meant four LTE, two WiFi, and one GPS antenna; plus seven connectors to the Digi router, the communication node for the equipment, all had to fit inside the cabinet. In addition to the multiple antennas and potential interference between the various wireless technologies, the antenna needed to be extremely rugged, weather resistant, and vandal proof.

Designed for City Life

The PCTEL engineering team was up to the challenge. PCTEL worked closely with the NYC DOT to develop and deploy 15,000 custom radome antennas, each measuring ten inches in diameter and four inches high. The antenna is designed to withstand harsh weather, vandalism, and general rough treatment, such as people climbing on top of the cabinets and jumping on them, which often happens during parades and other special events in NYC.

"PCTEL identified how we could turn the design into a functioning antenna that addressed all of our challenges," shared Kelly. "They were open to suggestions and did a great job working with me to make it happen."

PERFORMANCE PLUS

In addition to the custom-designed radome antenna mounted directly on the cabinet, the PCTEL team created pole-mounted antennas for the deep "canyons" of Manhattan, where high-rise buildings can block cellular signals. "The PCTEL antenna works really well with the Digi router," remarked Mazur. "The performance is phenomenal. In a city with a high level of electromagnetic noise, to have that kind of clarity and signal level at a good gain means the system works and the links are closing and staying up and reliable."

Improved Connectivity = Cost Savings

"The overall project is an absolute success," said Kelly, crediting the PCTEL antenna as a key contributor to the outcomes. He explained that the new system that includes the AT&T cellular connection, the Digi router and the PCTEL antenna increased connectivity by 27%, which means that 2,500-3,000 more intersections are now connected. "The savings alone from not having to deploy crews to manage connectivity issues is just incredible," added Kelly.



ANTENNA DESIGN IS WHAT WE DO

PCTEL performance-based antennas support Intelligent Transportation Systems (ITS) requirements and are compatible with the world's leading 4G/5G cellular providers. Our purpose-built antennas can connect to industrial IoT routers and components to enhance availability, improve operations, and maximize performance.

"Our engineers have in-house access to multiple anechoic chambers to measure antenna characterization, electromagnetic interference, and compatibility; as well as to an environmental test lab to perform vibration, corrosion, temperature, shock, and humidity tests," explained Daniel Laredo, PCTEL Vice President, Global Business Development.

"Our technology and expertise means our antennas can quickly adapt to meet specific ITS wireless and environmental requirements," added Laredo.



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