

Customer case study

## Transportation Infrastructure

### 900 MHz wireless SCADA network communicates over several miles of infrastructure

*Energy management system for wayside rail application provides significant cost savings and reliability to New York City Transit*

**kapsch** >>>

**DYNAC**<sup>®</sup>

#### Summary

- The Metropolitan Transportation Authority (MTA) NYC Transit wanted to reduce its energy cost through energy savings.
- Their project planning team collaborated with Phoenix Contact to develop a concept approach to network communications and control over a large geographic area encompassing the five boroughs of New York City.
- New York Power Authority, Kapsch TrafficCom and Phoenix Contact worked together in developing a system design that could be implemented without disrupting transit system services.
- The result was a wireless communication network system designed to monitor and control non-vital wayside infrastructure back to a master host.
- Thanks to Kapsch's DYNAC<sup>®</sup> SCADA HMI software and hardware and Phoenix Contact's extensive line of industrial radios and other products, NYC Transit has already significantly reduced its power costs by about \$10,500 per day.

#### Customer profile

NYC Transit operates 820 miles of track, making it one of the largest rail transit systems in the world. Millions of people ride the subway every day. In fact, in September 2014, the agency recorded five days with more than 6 million riders, breaking the previous single-day ridership record five times in a single month.

In an October 22, 2014 press release about the record-setting ridership numbers, MTA New York City Transit President Carmen Bianco said, "The trend towards increasing ridership is not expected to slow down. Improved transit services, combined with a growing population and an improved economy, have resulted in the strongest subway ridership growth occurring among discretionary riders and during off-peak times. This presents new challenges for maintaining and improving a system that operates around the clock, while introducing important innovations for our customers."



**By automating the third rail heaters on the above ground section of its railway, the NYC Transit saves millions of dollars in energy costs.**

**VAL-MS surge protective devices increase the reliability of the communication. The "shoe box" power distribution boxes located on the third rail track provide electricity to heat the third rail during inclement weather.**



## Challenge

The wayside third rail of a railroad is the electrified rail that supplies power to the trains. The third rail lies outside the subway tracks. A current collector shoe carries the power from the rail to the train's electric motor.

This subway system distributes 600 V DC (nominal power) and up to 4,000 A to the third rail. The system uses a network of AC/DC rectifiers, power substations, circuit breaker houses (CBHs) and high-voltage cables to supply DC power to the third rail throughout the system. This network system taps off the 600 V DC circuits.

During the winter, snow and ice may build up on the third rail, interrupting service. To keep snow and ice off the third rail, the NYC Transit uses third rail heater elements placed in strategic locations on the outside portions of the system. Traditionally, these heaters were manually turned on in October and ran continuously through May, even when there was no snow on the ground. This consumed an enormous amount of power and money. To save energy and reduce costs, NYC Transit wanted a reliable and efficient way to remotely control and monitor these heat traces during inclement weather events.

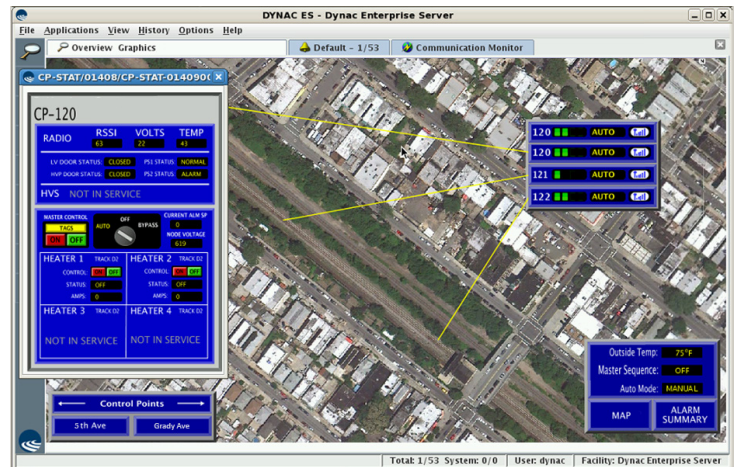
## Solution

Kapsch TrafficCom USA, Inc., working with Phoenix Contact, developed a supervisory control and data acquisition (SCADA) network system using wireless technology that allows NYC Transit to remotely control and monitor all the end points.

Powered by Kapsch's DYNAC software, the SCADA system allows integrated management of the subway wayside infrastructure. Operators can remotely perform routine system diagnostics to ensure the heaters are ready for operation at any time, all from a single HMI interface.

At select locations, Phoenix Contact ILC programmable logic controllers (PLCs) were used to control and monitor end devices. The ILC products are compact controllers with advanced control capability. The ILC family of controllers communicate on Modbus TCP protocol, and versions include SD card slot for ease of saving and uploading program changes.

The application included different types of interface panels. They serve as the primary link between the DYNAC SCADA master and a network of control point nodes throughout the network. Each node controls and collects, plus holds data for SCADA commands, via 900 MHz Ethernet radios.



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Several hundred communication nodes spread over many miles consist of Kapsch's NEMA 4x enclosures, including radios and controllers. The radio box holds Phoenix Contact's low-voltage radios, controllers and I/O, relays, power supplies and transducers. For further reliability, the boxes also include Phoenix Contact's surge protection technologies that protect electronic interfaces from high-voltage surges, which can be common in this environment.

Kapsch, in partnership with Phoenix Contact, configured the radio network. This radio communications network system provides a remote means of monitoring and controlling end-point devices over a large network.

The system is designed to run either manually or automatically from NYC Transit's control room.

## Results

To date, 486 control point nodes are automated, controlling 963 third rail heating elements. With the current installation, NYC Transit is saving almost \$10,500 per day in reduced power consumption costs and manual operation of heater-related equipment. Because of a collaborative partnership and effort by all parties, this wireless SCADA system has achieved significant energy savings that will exceed well over a million dollars annually. It is expected that by May 1, 2015, NYC Transit will control over 500 control points and over 1,000 third rail heater elements. In the following phases, NYC Transit will look to control 100 percent of their third rail heaters remotely, saving energy at about \$15,000 per day from October through May.