

Lightning-fast switching helps New York City stay bright

September 4 2015, by Norbert Aschenbrenner



Together with New York energy provider Con Edison, Siemens is making the power grid in Lower Manhattan more resistant to flooding-related outages.

Steps in this direction include an automation system that can divide two of the region's distribution grids into a total of four sub grids in just fractions of a second, thus preventing a disturbance from spreading throughout the entire grid. This allows the [power supply](#) in the undamaged sections to remain in service so that an outage affects fewer people. The area where the power supply has now been designed to better withstand storms includes the Financial District.

When hurricanes make land, they often cause flooding, sometimes resulting in [power outages](#). Such events can spread throughout the grid in a matter of seconds and can also knock out the power in unflooded regions. After Hurricane Sandy swept through the region in 2012, more than 800,000 New Yorkers were left without electricity for days. Experts predict that the number of violent storms will continue to rise in the future, which is why Con Edison decided to invest in measures to enhance the resilience of its infrastructure.

Disconnecting Sub Grids in Milliseconds

One way to limit the impact of power outages is to divide the [power grid](#) into smaller units. When a failure occurs, these units are instantly disconnected from the grid. This is achieved with a number of centrally controlled switching stations. A total of 44 such stations are installed in the two distribution grids that Con Edison operates in Lower Manhattan. To keep the rest of the grid stable when disconnecting a damaged sub grid, the control center has to operate up to 20 switches simultaneously in a matter of milliseconds. Controlling such a large number of switches nearly concurrently is a challenge, since they are also distributed over the entire expanse of the grid. Communication therefore takes place over a high-speed, redundant fiber-optic network.

Siemens developed the automation system for controlling the switching stations on the basis of its Siprotec 7SC80 grid controllers. Each

switching station is controlled by a controller of this type. When the control center issues a command to open or close a switch, it takes only four milliseconds for this command to travel from the first to the last switch via the fiber-optic network. To make this possible, Siemens relies on special communication technology, specifically a GOOSE protocol. The protocol operates in real time and permits high-speed, simultaneous transmission in the fiber-optic network. The 7SC80 controllers were also equipped with an interface for Con Edison's power distribution management system. In addition, since Con Edison frequently uses switches that work underwater, the controllers had to be designed accordingly. Before deploying the controllers in New York City's power grid, Siemens tested the entire solution in-house to ensure that the controllers would meet the required simultaneous switching speeds.

Provided by Siemens

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