Tower Management

LTE-Enabled

Tower operators and their footprint are growing rapidly. As the number of towers increase and the footprint expands, understanding site conditions becomes more challenging. The tower's support infrastructure is critical to the success of both the tower operator and their customers. One of the most challenging requirements is monitoring tower assets (generators, batteries, tower lights, etc.) and knowing how to accurately bill each tenant for energy consumption, including the varying cost of providing the power (commercial, fuel-based backup sources, etc.).

The Kentrox tower management solution provides the applications required to help tower operators remotely and intelligently monitor, manage, and control the tower infrastructure. This enables operators to help meet the required service level agreements (SLAs) that are critical to their success and the success of their tenants. The applications use the Optima management system and Remote suite of products to monitor tower assets by providing the following:
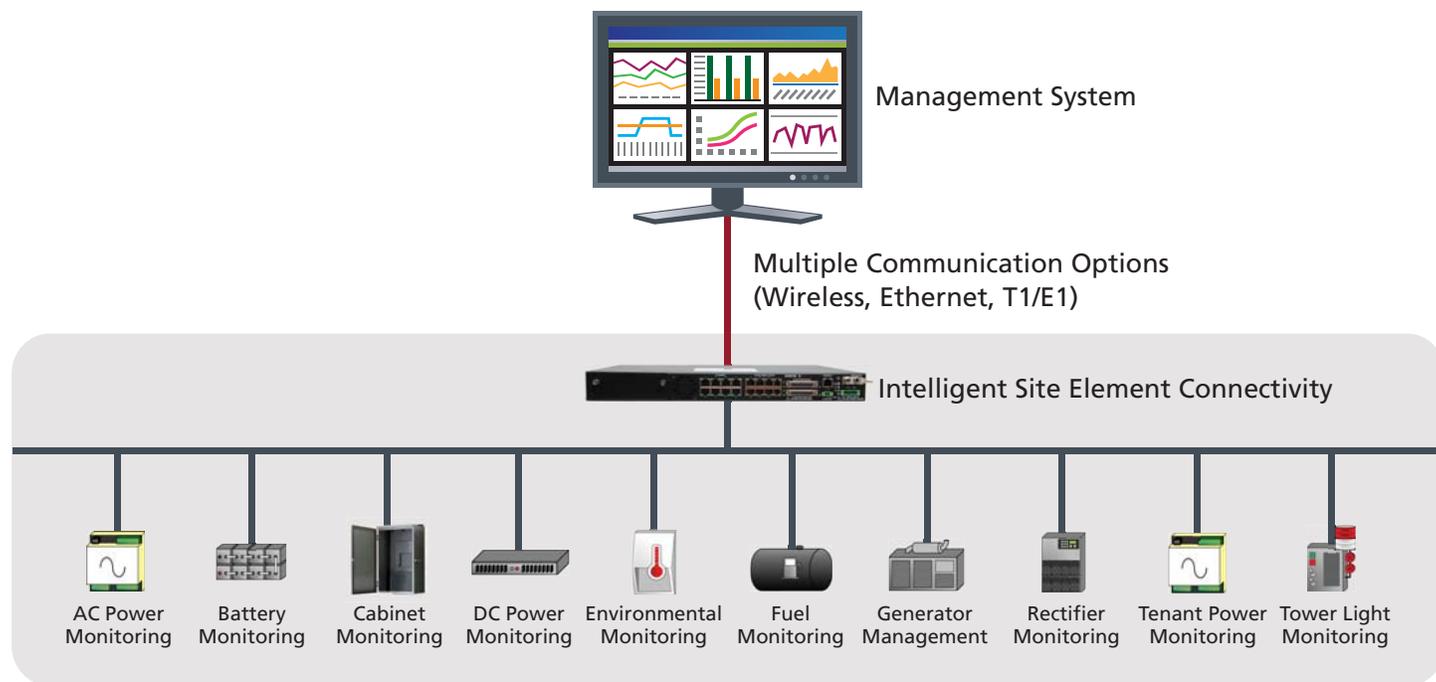
- AC power monitoring
- Battery monitoring
- Cabinet monitoring
- DC power monitoring
- Environmental monitoring
- Fuel monitoring
- Generator management
- Rectifier monitoring
- Tenant power metering
- Tower light monitoring

Some of the many benefits the Kentrox tower management solution provides include the following:

- Ensures the tower assets (shelters, power, light, etc.) are functioning correctly
- Provides a comprehensive view of the support infrastructure
- Automatically notifies the relevant personnel if issues arise
- Enables the accurate billing of multiple tenants at one location based on their actual energy and energy type used

Kentrox Tower Management Solution

Management System

Multiple Communication Options
(Wireless, Ethernet, T1/E1)

Intelligent Site Element Connectivity

| AC Power Monitoring | Battery Monitoring | Cabinet Monitoring | DC Power Monitoring | Environmental Monitoring | Fuel Monitoring | Generator Management | Rectifier Monitoring | Tenant Power Monitoring | Tower Light Monitoring |

kentrox

Tower Management

Tower management applications

AC power monitoring

Power is required for site availability, and power-related problems or degradations can adversely impact the infrastructure and ability to supply service. The Kentrox AC power monitoring application monitors the total power being delivered to the site and looks for improvements within the site such as detailing AC power conditions (low voltage, unbalanced phases, phase outages, etc.) that can lead to equipment damage, failure, or malfunctions. It also identifies trends in the quality of AC power delivered to the site which provides valuable input into the planning of future site equipment upgrades and improvements.

Power failure report displaying the number of incidents of power failures for each power type available (battery, generator, commercial, and site power) and the duration of each failure.

Battery monitoring

Battery systems are one of the most common energy storage devices for supplying backup power when necessary but are typically unmanaged. The Kentrox battery monitoring application monitors the batteries during charge, float, and discharge cycles and predicts the battery discharge time during outages. It also provides the details needed for managing the infrastructure and alarms for potential problems.
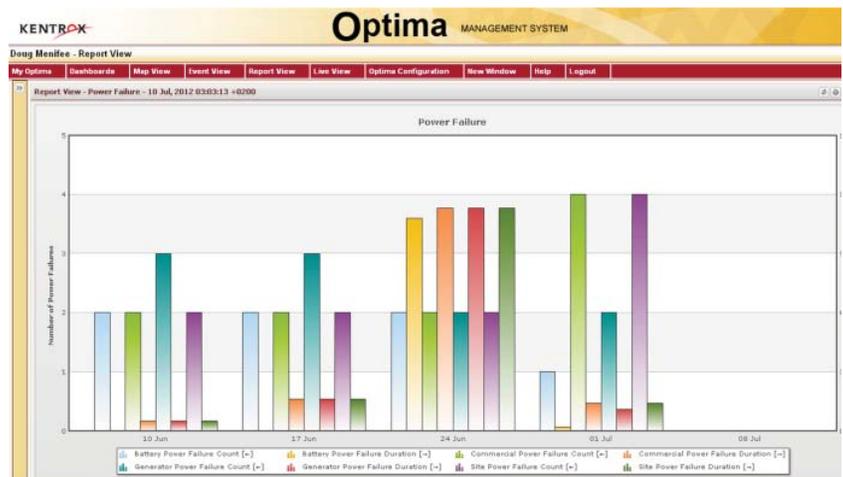
Cabinet monitoring

Monitoring the cabinet at a tower site is critical to ensure the safety of the site management solution. The Kentrox cabinet monitoring application monitors the environmental conditions of the Kentrox cabinet (temperature and humidity) and provides battery backup for the solution if all other types of power are unavailable.

DC power monitoring

All traffic bearing electronics at a site require DC power. The DC power monitoring application from Kentrox provides remote access to real-time and historical data to understand the condition of the DC equipment. It provides a real-time view of DC power consumption and the DC equipment load distribution throughout the site. It also helps detect problem conditions (such as low voltage) that could lead to equipment damage, failure, or malfunctions.

Environmental monitoring

Monitoring environmental conditions at a site is critical to maintaining proper conditions for the equipment. The Kentrox environmental monitoring application for tower operators monitors the indoor and outdoor temperature and humidity at the site and initiates alarms on conditions that are outside of a specified range. It also monitors the shelter door to send notification when the door is open.

Fuel monitoring

Fuel is critical to backup power availability and is often required as a primary source for providing generator power. The fuel monitoring application from Kentrox constantly monitors fuel levels, identifies high consumption situations (often caused by leaks or theft), and monitors fuel delivery amounts to compare with actual invoiced amounts. Fuel contaminants (water for example) may also be detected and can provide the tower operator with indications that maintenance of the fuel tank is required.

Generator management

Tower operators may utilize generators to maintain the availability of sites. To manage generators, the Kentrox generator management application monitors its status including the fuel
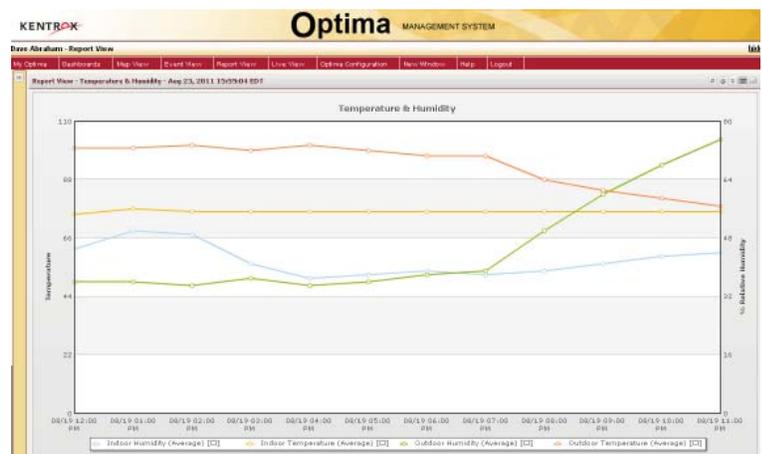
Environmental monitoring report displaying the average indoor and outdoor temperature and humidity.

levels, performs remote power cycles for preventative maintenance, meets mandates for accurate measurement of runtime, and remotely controls the generator (allows start/stop of supported systems and automatically tests it).

Rectifier monitoring
DC power is supplied by rectifiers to a site for traffic bearing electronics and batteries for charging. The Kentrox rectifier monitoring application monitors the capacity utilization during normal running and discharge conditions, identifies sites where over-rectification is occurring, and ensures proper DC power is supplied to critical site equipment.

Tenant power metering
Power is required for a tenant's success, and understanding power usage by each tenant is important. The tenant power metering application from Kentrox provides detail on site power and energy used by each tenant for accurate billing of commercial AC and generator power.

Tower light monitoring
Many towers are required to have a light or multiple lights for compliance. The Kentrox tower light monitoring application provides remote monitoring and automated reporting of the light's performance and enables remote access and test control for many light types.

Interactive applications
The applications in the tower management solution work together, providing intelligent information to a tower operator. For example, the information obtained from the battery, rectifier, and DC power monitoring applications can result in a comprehensive understanding of a battery's capacity to extend the useful life of the capital investment. The fuel monitoring and generator management applications combine to provide the information required to identify the generator runtime available, facilitate timely refills, and eliminate unnecessary site visits. This reduces operating costs and improves network availability, especially during emergency situations.

The products
The Optima management system provides complete visibility and control of network infrastructure sites, such as cell sites and remote communication shelters. It allows immediate operational cost reduction to organizations that need to access, monitor, and manage large numbers of sites. Optima delivers these site benefits by remote monitoring, control, and automation over the maintenance and management of infrastructure and physical elements.

The Remote suite of products includes monitoring and control site devices that provide IP management to remote locations and equipment. The products provide site alarm monitoring, protocol conversion, and equipment connectivity and acts as an intelligent extension of your Operations Support Systems (OSS). It is designed to enhance your network management strategy, reduce operational costs, and improve operational efficiency with reduced truck rolls.
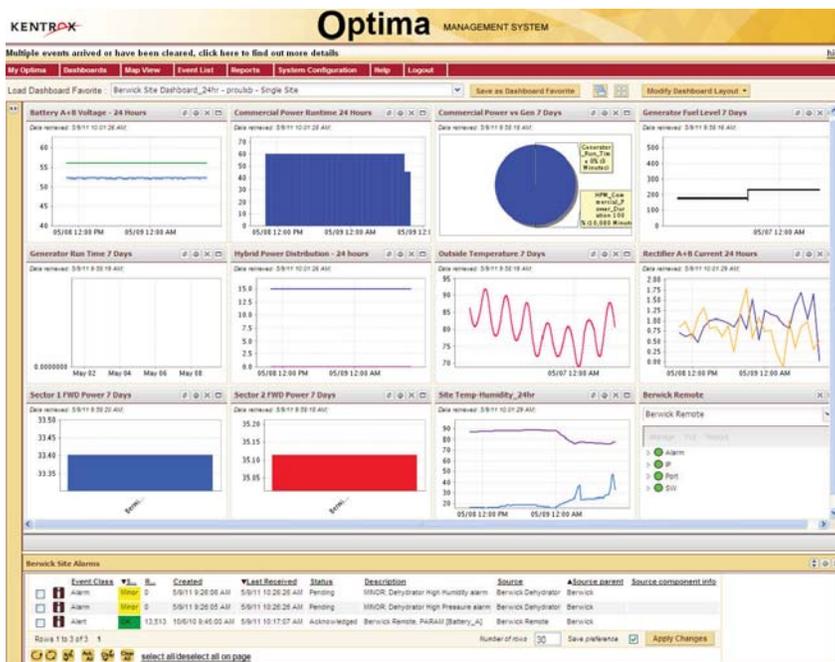
Remote RMX-3200

Remote RMM-1400

Optima dashboard displaying conditions of a site for a 24 hour period and site alarms.

Live View report for tower management showing status of site conditions and applications.

An optional cabinet

Site equipment is often stored in a cabinet at the tower site. Kentrox has a cabinet option that is a lightweight, weather resistant fiberglass wall mount enclosure. The equipment included in this enclosure is the Remote RMM-1400 with wireless modem, Remote RMB-1 and sensor interface wiring block, up to five (5) power meters, and a +24 VDC power converter and dual gel cell standby battery set. A pole mount kit and external wireless modem antenna are also available.

Kentrox for tower management

The intelligent tower management solution from Kentrox allows tower operators to be proactive in managing sites, and the interactive applications provide a comprehensive view of the support infrastructure. The out of the box functionality provides a simplified configuration and setup to minimize the time required for implementation, and the remote access capabilities reduce the number of site visits required.

The solution also enables tower operators to obtain the information necessary for strategic planning of site upgrades and future site development. For example, power reports provide the data needed (number and length of power outages across a network) to understand which sites should have permanent generators and which can use portable generators. Power reports can also help planners determine when certain equipment (circuit breakers, batteries, rectifiers, and heating, ventilating, and air conditioning units) require capacity increases to manage additional load requirements.

The Kentrox tower management solution enables the tower operator to ensure the tower assets (shelters, power, lights, etc.) are functioning correctly, be notified if issues arise, and accurately bill tenants for actual energy consumption ultimately reducing network and operating costs, maximizing the capital investment, and improving network performance and availability.

For more information, visit www.kentrox.com, email info@kentrox.com, or call 800-733-5511 (US), +1 614-798-2000 (outside US).