

# SOUND & COMMUNICATIONS

AV FOR SYSTEMS INTEGRATORS, CONTRACTORS AND CONSULTANTS

## AV IN CHARGE

Keeping major power grids a buzz.

BY JOHN STARK

On August 14, 2003, the biggest power outage in North American history occurred in parts of the Northeast and Midwestern US, and in Ontario, Canada; sources have estimated that it affected some 10 million people in Canada, and 40 million in eight US states.

Although there were many factors contributing to the outage, the blackout raised the importance of monitoring power distribution used by the independent system operators and control room operators who track power consumption across the grid, right down to the individual business or home.

### Modernizing SCADA

Natural disasters and security, as well as the need to save energy, money and time, have resulted in a huge push to upgrade and modernize SCADA (supervisory control and data acquisition) systems found in power transmission and distribution systems. Increasingly, opera-



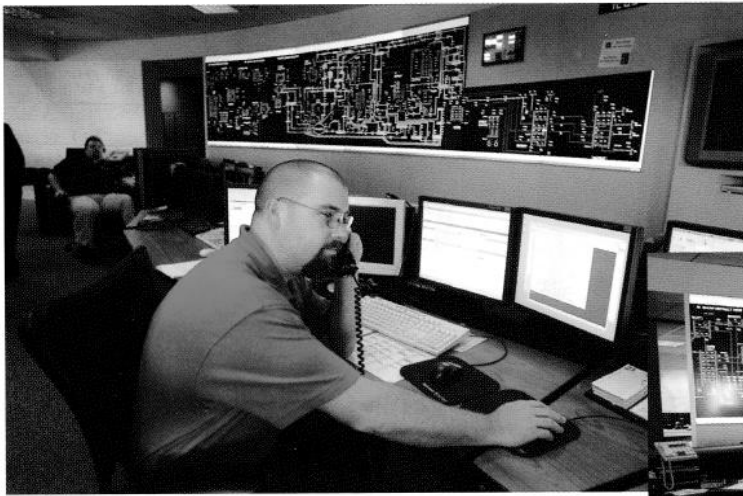
Based in San Francisco, PG & E is one of the country's largest power companies, responsible for the transmission and delivery of energy to some 15 million people through out its the 70,000-square mile service area in parts of Northern and Central California. About three years ago, its Transmission Operations decided to install a state-of-the-art display wall to monitor its system.

tors of these systems are moving to state-of-the-art command and control centers that monitor the flow of data from a single wall, and to the training and equipment that will protect against future outages. Installation or upgrade of these new control centers represent a tremendous growth opportunity for those

systems integrators, contractors and consultants involved in command and control.

Here, we'll discuss how two of North America's largest companies, Pacific Gas and Electric Company (PG&E) and Hydro Ottawa [see sidebar, page 58] have dealt with the challenge.

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Each operator can control the large display wall and combine inputs from any source as needed. Here, system dispatcher Wes Kellison reviews the Energy Management System alarm monitoring screen on his desktop while a diagram of the PACI and the 230kV transmission system (in blue) is shown on the display wall.



PG&E's Grid Operations display wall has become a source of pride for the systems operators, and the focal point of the Operations Center, viewable from anywhere in the room. Grid Operations manager Bruce Henry (second from left) explains one of the many Electric Operations Diagrams used in managing the grid. On the display wall is an overview of the PACI with the 230Kv transmission system displayed. On the right are various energy management system monitoring screens.

## PG&E TOC

Based in San Francisco, PG&E is one of the country's largest power companies. It is responsible for the transmission and delivery of energy to approximately 15 million people throughout a 70,000-square-mile service area in the Northern and Central parts of California, from Eureka to Bakersfield.

PG&E's system dispatchers are the air traffic controllers of the electric power grid, with responsibility of monitoring some 190,000 miles of electric transmission and distribution circuits. In addition, the transmission operations center provides a single point of contact for PG&E field control, manages real-time operational tools and emergency operations, and directs transmission of electric power on the PG&E grid.

As many other power companies, PG&E previously relied on a mosaic-tile map board to monitor operational status of its 500 kilovolt (kV) network, and to provide proactive notice of possible problems or system failure. The mosaic map board provided a one-line schematic of the 500kV network with substation status at

the breaker level.

Although this provided a good overview of the system, it was not interactive. As PG&E relied more heavily on its EMS and SCADA software to monitor the transmission system, a need was identified to provide a more complete, real-time overview of current system operating conditions.

About three years ago, Transmission Operations decided to replace this static approach with a more dynamic and interactive system utilizing new videowall display technology that would combine the existing diagrams with flow data and additional information from TV, DVD, VHS, broadcast, cable and SCADA inputs. They also wanted a system that could be viewed by all system dispatchers, and one that allowed any system dispatcher to update

the main display.

Due to budget constraints, PG&E elected to follow a two-phase approach. It was decided to integrate a two-high by five-wide display matrix flanked on the right side by two additional displays positioned in the lower row. The final integration phase would add an additional four displays, to finish out a two-high by eight-wide matrix display.

## Chief Challenges

The Transmission Operations Center required a solution that allowed the new system to be installed in a preexisting facility and a preexisting enclosure, without impacting ongoing operations. In addition, whatever system was installed would be subject to stringent seismic regulations. The new system not only had to integrate

with PG&E's existing systems, it had to do so with a fit and finish that was consistent with the company's interior requirements. PG&E also desired the relocation of several alphanumeric readout displays as well as an annunciator system that communicated with California ISO.

Display wall technology provided the Transmission Operations Center with the best combination of expedient installation, ease of use, centralized operation and systems integration. When considering the best monitoring option for its system, the Transmission Operations Center explored a variety of display mediums. One key consideration was readability, not only from a brightness standpoint, but also from a font character height.

PG&E's Transmission Operations Center is above ground and surrounded by windows, so it requires brighter lighting than front projection could provide. When the viewing distances were considered, an XGA resolution projector offered the best font-viewing characteristics. Due to an existing structural beam within the control room, two rows of 50-inch

diagonal projection cubes best fit the viewing environment.

## **Evaluated Many**

PG&E evaluated many displays. Each was considered for overall performance characteristics, physical space requirements, durability, lifetime maintenance and cost of ownership.

The Transmission Operations Center performed a thorough vendor review before selecting systems integrator Mauell Corp., a company with a great deal of experience in complex command and control installations. Mauell proposed 50-inch diagonal, DLP-based rear projection cubes and a powerful display wall processor. Mauell also took on the internal manufacturing capabilities to accommodate the structural requirements of the build.

In the Phase One integration, PG&E erected a plastic sheeting area to contain dust and debris from the install. Mauell dissected a large section of the existing enclosure and then erected the projection cube support structure, including new steel fascia panels. The back of the system features custom steel cabinetry to provide access to the rear of the equipment. In addition, Mauell manufactured a unique vertical mount for the display wall processor. This saved valuable real estate within the enclosure and made access to the processor easy.

The Phase Two installation was completed prior to end of 2006. Mauell again was chosen to build out the remaining display area of the enclosure. This time, critical alphanumeric displays and an annunciator box, along with its corresponding wiring, were shifted

to the far right of the enclosure. In addition to the new displays, the initial display wall processor was expanded to accommodate four more outputs. Mauell relocated the processor and provided a smoke glass door to allow access to the unit from the front of the wall.

It took the systems integrator 2½ weeks of onsite work, but Mauell handled the whole process with no disruption of work to the Transmission Operations Center.

## **Video Display Wall Processor**

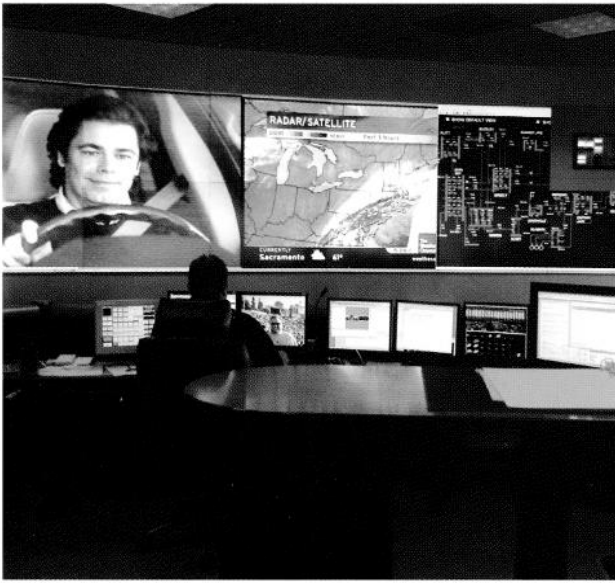
A video display wall is the heart of the operations center, capable of displaying data from a broad range of information sources from remote system monitors, the internet, a high-speed network, TV, workstation, PCs or their own applications, onto a shared screen. On the back end, the display wall processor acts as the brains of the system, allowing information from all of these disparate sources, in whatever format, to be combined in whatever combination is required on a single screen.

The display wall processor enables the dispatchers to organize and manage all the data that appears on a display wall screen to see and share the same information from many different sources and formats, and to size and place them anywhere on the screen. These powerful controllers allow users to switch easily among inputs as required to monitor power demands, transmission and flow throughout an entire city or even, as in the case of PG&E, half of the entire state of California.

### **Mauell Corp.**

Mauell Corp. provides monitoring and control solutions within the electric utility control room environment. Since its inception in 1971, Mauell's focus has always been to provide its customers with key insights into and control over their mission-critical operations. This focus on process is designed into every mapboard, video display wall system, operator workstation, storage, software solution and control panel the company builds.

For additional information, go to [www.mauell-us.com](http://www.mauell-us.com).



A video display wall processor enables operators to pull in and display data from a broad range of information sources, from remote system monitors, the internet, a high-speed network, TV, workstation, PCs or their own applications, onto a shared screen.

## Results

The display wall “exceeded expectations for readability, brightness, control, ease of use and sheer elegance,” according to Transmission Operations Center manager Bruce Henry. Henry also praised the reliability of the system, which has been operative since April 2006 without a single breakdown.

It has become a source of pride for the system operators, and the focal point of the operations center, viewable from anywhere in the room. Each system operator can control the large display wall and combine inputs from any source on an as-needed basis. The system can instantly retain and recall layouts for particular needs. It has been so successful for PG&E that the company is looking forward to utilizing this same technology in its expansion in 2009, when it will build a new primary Transmission Operations Center.

Mauell is also happy with the results. Company president Gary Suchy offered, “A great communication link was established between the PGE and Mauell teams. That was paramount to identifying their needs in the design and also to uncovering the incidentals of the build and integration of the system.” ■

## DuoCom

DuoCom is Canada’s leading provider of audiovisual solutions. The Montreal-based systems integrator has nine locations throughout Canada: Montreal, Toronto, Ottawa, Vancouver, Kitchener, Kingston, Quebec, Moncton and Halifax. It has been in business since 1974.

## Hydro Ottawa

Another such authority is Hydro Ottawa, whose challenge was to unite the operations of five different utilities and five sets of work practices into a single new hydro electric utility, and to upgrade its command and control operations to a new state-of-the-art Operations Management System (OMS).

This system would track and manage calls, measure electric flow, control distribution and alert for outages, and monitor security throughout the system. It would also bring all the data into a single large centrally displayed screen that would monitor flow data, real-time video, TV, broadcast, cable and SCADA inputs. It would also enable Hydro Ottawa to complete the merger successfully and upgrade its system with a new state-of-the-art system OMS.

At the time, Hydro Ottawa, as is the case with other utilities, used symbolic line drawings on paper and wanted to make the change from paper to a digital electronic format. There is still a lot of paper that was used in the transition, and even now as a back up. Long term, the utility plans to transfer all of its information into the display and manage everything for the transmission facility.

Work between Hydro Ottawa and its systems integrator, DuoCom, greatly contributed to the project’s success and enabled the utility to get up and running with its new system almost seamlessly, said Ky Roesler, supervisor, System Operations, Hydro Ottawa. The utility relied on DuoCom to help staff make the transition and learn the new tools. It was a collaborative and interactive process with the changes and modifications, and dry runs and practice prior to going live.

“We just clicked from the start and worked together with DuoCom and its control wall vendor,” said Roesler. Even today, DuoCom remains involved, a partner making suggestions for improvements and solving any problems that might occur.

Initially, the power distributor looked at a smaller 1x4-unit wall and display wall controllers from a different vendor. But when the decision was made to go to a 2x4 display wall, there was no way the competitive processor could cover the high-performance project.

The system has been up and running for 18 months for some 15,000 hours, with no service failures.

Hydro Ottawa now works as a single team from the same rules and equipment, the same platform and maps. The utility has a unified and collaborative approach. There are people on duty 24/7, and outage and response times are much quicker. Today the utility is the second largest electricity distribution company in Ottawa, responsible for the delivery of electricity to more than 282,000 residential and business customers and more 1050 square kilometers of power distribution.