CYBER⊙SWITCHING®

Power Submetering

Smart Submetering from Cyber Switching

Real-Time Monitoring of Vital Power Systems

CYBER ⏻ SWITCHING®

Your Power. Managed Your Way.

Good Information Allows for Good Decisions

U.S. buildings consume nearly 75% of all electrical energy produced each year. While companies across the nation take steps to cut costs, power use becomes an elusive target. The average commercial building spends almost **30 percent of its total operating expenses** on electricity and gas. What systems are using most of this power? Is it being wasted? If so, by what tenant or department? These questions raise an even greater question. How do we get a handle on our electrical power use?

The answer is found in the use of submetering technologies. Submetering systems are designed to monitor and measure electrical power by various systems within a facility. Submeters can be easily installed to monitor HVAC, indoor and outdoor lighting, computer facilities, refrigeration, general receptacles, and electrical vehicle charging stations. With advanced submeters in place, each system's use of electrical power can be identfied and outlying heavy users can be targeted for energy efficiency programs. Armed with such real-time information, a facility manager can then take steps towards troubleshooting unexplained power use or implementing more effective energy cost saving initiatives.

Submeters are also designed to be installed to meter the electrical power use by subtenants in a commercial building, giving a facility manager the ability to track and bill-back for tenant power use. This allows for the recapturing of energy costs, and creates a cost-saving mindset in tenants as well.

The key in all of this is that **good information allows for good decisions** and with power use that can mean an increase in a company's bottom line as power "hogs" are identified and cost saving initiatives for power consumption are effectively implemented.

The Benefits of Submetering

Why Submeter? Submetering provides facility managers real-time and historic data on power use and power quality, leading to a litany of benefits, including:

Reduced Energy Costs

By identifying energy usage by system, department, or building, energy-saving initiatives can be implemented to reduce costs. Knowing where the power is consumed creates the ability to discover energy wasting equipment or to plan load shedding of non-essential systems to off-peak hours. The result: good decisions can be made as to where and when to use that energy more efficiently.

Energy Use Planning for Time of Use Billing

The deployment of smart meters has given utilities the ability to also have intelligent information on energy use. One of the results of this is that many utilities have or will soon be billing customers based on Time of Use. Submetering allows for facility and business managers to know which systems are using power *and when.* This can lead to proper planning of energy use and avoid paying a premium under Time of Use.

Tenant Billing

The ability to isolate and meter the power consumption of individual tenants provides the framework to bill those same tenants for the power used. By implementing submetering, two results occur: the building owner can accurately bill the tenants based on their power usage, and tenants become far more energy conscious.

Cost Recovery/Allocation

Where different departments exist in a large organization, power costs can be accurately allocated by departmental use. This provides business managers precise information on the costs of running their businesses and for department managers to develop and execute energy conservation initiatives where it really counts.

Multi-Site Rate Negotiation

Where a single enterprise has multiple sites with power provided by a single supplier, the ability to capture the whole enterprise's use and aggregate that into a single use and cost factor gives that enterprise leverage in negotiating more favorable rates.

Performance Monitoring

From an engineering perspective, submetering allows for the identification of performance problems and the quick response to failures of system components. With real-time monitoring and alerting, submetering can identify drastic changes in power usage that could be indicative of systemic problems, and immediate reactive or preventative measures can be taken to safeguard important and costly equipment.

Government Regulation Compliance (Title 24, etc.)

Many states are adopting building standards for new construction and remodels that include submetering requirements. California's Title 24 standard does this. Other states have and will continue to follow suit. The goal is efficient and responsible energy use. Advanced submetering provides for compliance to these new responsible building standards.

Integration with Building Management Systems

Common in commercial building space are Building Management Systems (BMS). As building automation has become more and more prevalent, so also has the need to manage and monitor power usage. Submetering systems must integrate with these systems in order to provide a single view of a building's systems.

The Case of the Errant Air Conditioner

It was a dark and stormy weekend. Really, it was. As I looked back at my energy bill I knew something was up. No one, and I mean no one was at the office on the weekends. Yet, energy bills had been high for months and months and I couldn't explain it. Then, we made the call to install the advanced submetering tools from Cyber Switching. With these in place, I could finally see my energy usage *by system*. Low and behold the culprit was found. An errant air conditioner was running both nights and weekends in spite of the thermostat's setting for just weekdays. I could see that the other subsystems had reduced power usage on nights and weekends, but thanks to my energy management console, I could see that the HVAC usage did not drop!! With a quick call to my heating and air service company, the faulty thermostat was replaced, and all was good.

Case solved! Thanks, Cyber!

Introducing the CS-400 Submetering System

A Title 24 compliant smart submeter solution, the CS-400 provides all of the benefits of submetering and offers ease of installation and cost-effective performance for commercial building power metering and monitoring, in both new and retrofit applications.

Designed for performance at an unprecedented price point, the CS-400 solution provides capabilities and performance which, until now, have only been available in significantly more costly meters. The system is comprised of modular components to efficiently meet requirements in all applications.

Energy Management: The CS-400 submetering solution enables facility professionals to proactively manage their energy usage to minimize utility demand charges on an ongoing basis and reduce average energy costs.

Modular Design and Scalability: The CS-400 has been created on a modular design with 4 key components: the CS-400-MM submeter module, the CS-400-SH submeter hub (which connects up to 8 meters,) the CS-400 -SG gateway (which in turn connects up to 7 submeter hubs), and the CS-400-CT coils. Further scalability can come with the use of the Cyber Switching Energy Management Console (EMC) which can connect to hundreds and hundreds of hubs, more than enough for even the largest facility.

Simplified Installation: Cyber's meters are UL Listed® for field installation into existing electrical subpanels. The hubs and gateways reside outside the subpanels and are connected to the meter modules via low-voltage wiring. A simple 1/2" punch-out and a 110v outlet are all that is needed to install the solution into an existing building power infrastructure.

Future Upgradability: The CS-400 submetering system utilizes the Cyber Switching technology platform, enabling facility or property managers to easily upgrade their submetering systems in the future if desired.

The CS-400 System Components

The CS-400-MM-030 and MM-060 Meters

Cyber Switching's submeters are highly accurate meter-grade devices capable of measuring real-time loads in kilowatts, kWh demand captured in 15 minute segments, total kWh demand, kW peak demand with the date and time of the peak, historic kWh peak demand, and other key variables. The MM-030 is a state-of-the-art three-phase submeter module designed to meet virtually every three-phase configuration up to 480V. The MM-060 is a multipoint submeter with six current input channels and three voltage channels providing a full range of measurement capability. With the integral 14-gauge sensing wires, the submeter can be mounted directly in a panel and connected to a circuit breaker and CT-Coils to capture amperage and voltage data (see the Voltage-Sync section below to understand additional savings). Both submeters are UL Listed ® for field installability.

The CS-400-SH Submeter Hub

The Submeter Hub provides a management interface for the CS-400 Submeter Modules. Connected using standard Ethernet connections and TCP/IP, the hub connects up to 8 meters. In turn, the hub can connect to either the CS-400-SG Gateway, to a networked server running Cyber's Energy Management and Control software (EMC), or to any standard SNMP-capable Building Management System for remote management and monitoring. So connected, the Hub provides comprehensive energy metering, monitoring, and data analysis. The Hub features a touchscreen LCD display for onsite access as well resulting in easy setup and real-time readouts.

The CS-400-SG Submeter Gateway

Cyber's Submeter Gateway enables advanced management of the Cyber Submetering solution, providing the capture, analysis, and storage of energy usage data from all of the connected devices. Designed with a feature-rich and user-friendly interface, the Gateway is part of a scalable and robust solution. Built with security in mind, the Gateway supports SNMPv3 and SSL encryptions. The Gateway comes pre-loaded with Cyber's Energy Management and Control dashboard (EMC) for advanced real-time management.

The CS-400-CT Split Core CT Coils

Cyber's innovative design of its CT coils allows for extremely quick and easy installations. With 4 configurations available, Cyber's CT coils are capable of metering power usage for 50, 100, 300, and 600 amp circuits. Like the Submeters above, Cyber's CT coils are also UL Listed ® for field installability and designed for easy retrofit projects.
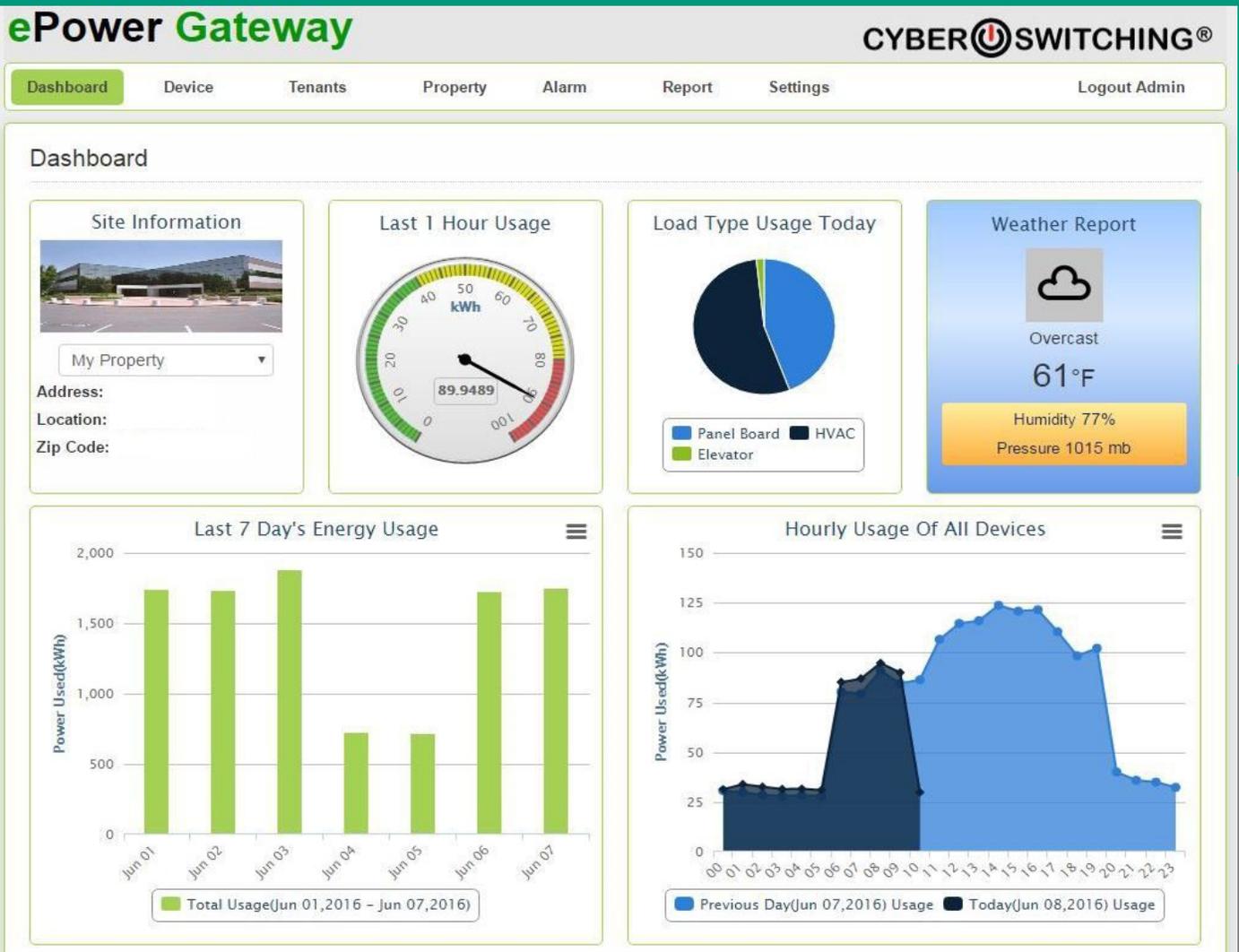
Voltage-Sync - A Unique Cost-Saver
One of Cyber's unique features is the use of Voltage-syncing the submeters. The approach reduces the cost and complexity of installing submeters by as much as 87%. Only a single submeter needs to be connected to a metered panel to gather the panel's voltage data. That base data is communicated through the Submeter Hub to the other meters in the system, reducing the material and labor that otherwise would be required to connect all of the meters to that panel. A true cost savings!

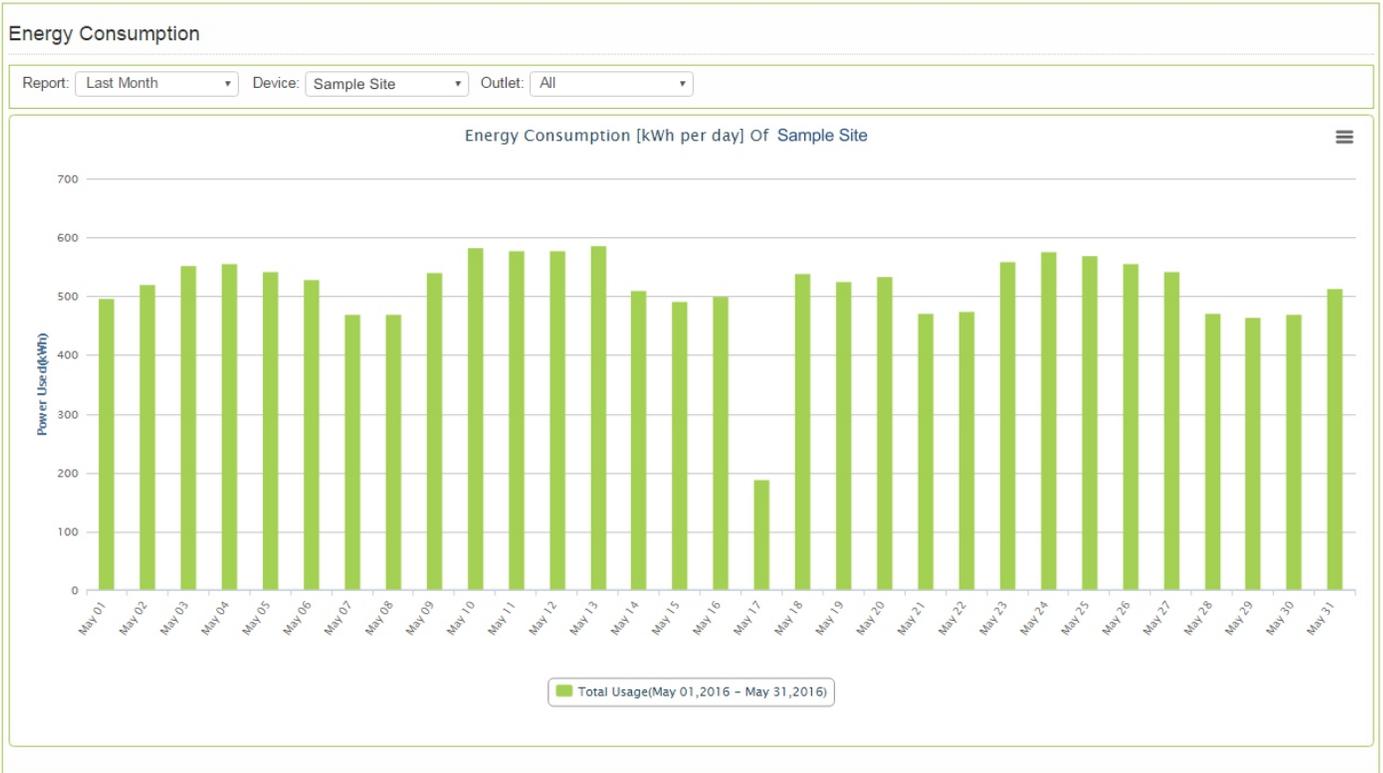CYBER SWITCHING®

Power Submetering

Energy Management with Cyber's EMC

Cyber's Energy Management & Control (EMC) software provides a robust management platform, consolidating data from every connected meter. Designed with an intuitive dashboard, the EMC puts effective energy management knowledge into the hands of facility and business managers. The EMC is available from any connected CS-400-SG Gateway or as a standalone application running on an enterprise server. As a server application, the dashboard can connect to multiple gateways or hubs and provide at a glance the following:

- Site information
- Last hour of usage
- Current day load type usage
- Daily weather reports
- Energy usage of all devices for the last seven days
- Hourly usage for the current day or previous day

Energy Consumption:

Energy Consumption

Report: [Last Month ▾] Device: [Sample Site ▾] Outlet: [All ▾]

Energy Consumption [kWh per day] Of Sample Site

Total Usage(May 01,2016 – May 31,2016)

The Energy Consumption Report shows the total power used in kWh per day of all attached devices. Several report periods can be chosen, including the current week or month as well as the last day, week, month, 7 days or 30 days.

Device Usage:

Device Name: SAMPLE SITE
Circuit: 2LDP A PH

Start Date: 2016-05-01
End Date: 2016-05-31

Weekday

Season	Peak Type	Total Power Used
Summer	Flat Rate	2803.2545
Total		2803.2545 kWh

Weekend/Holiday

Season	Peak Type	Total Power Used
Summer	Flat Rate	1060.0858
Total		1060.0858 kWh

Grand Total

Day Type	Total Power Used
Weekday	2803.2545
Weekend/Holiday	1060.0858
Total	3863.3403 kWh

Electrical Usage Report – Sample Site

May 04
2:Flat Rate: 135.6273 kWh
Total: 135.6273

1:Flat Rate   2:Flat Rate

The Device Usage report displays total power used, for Weekday, Weekend/Holiday, and Grand Total for the current week, month, or year and the last day, week, month, 7 days or 30 days, and customizable year.

Trend or Trend V/A Report
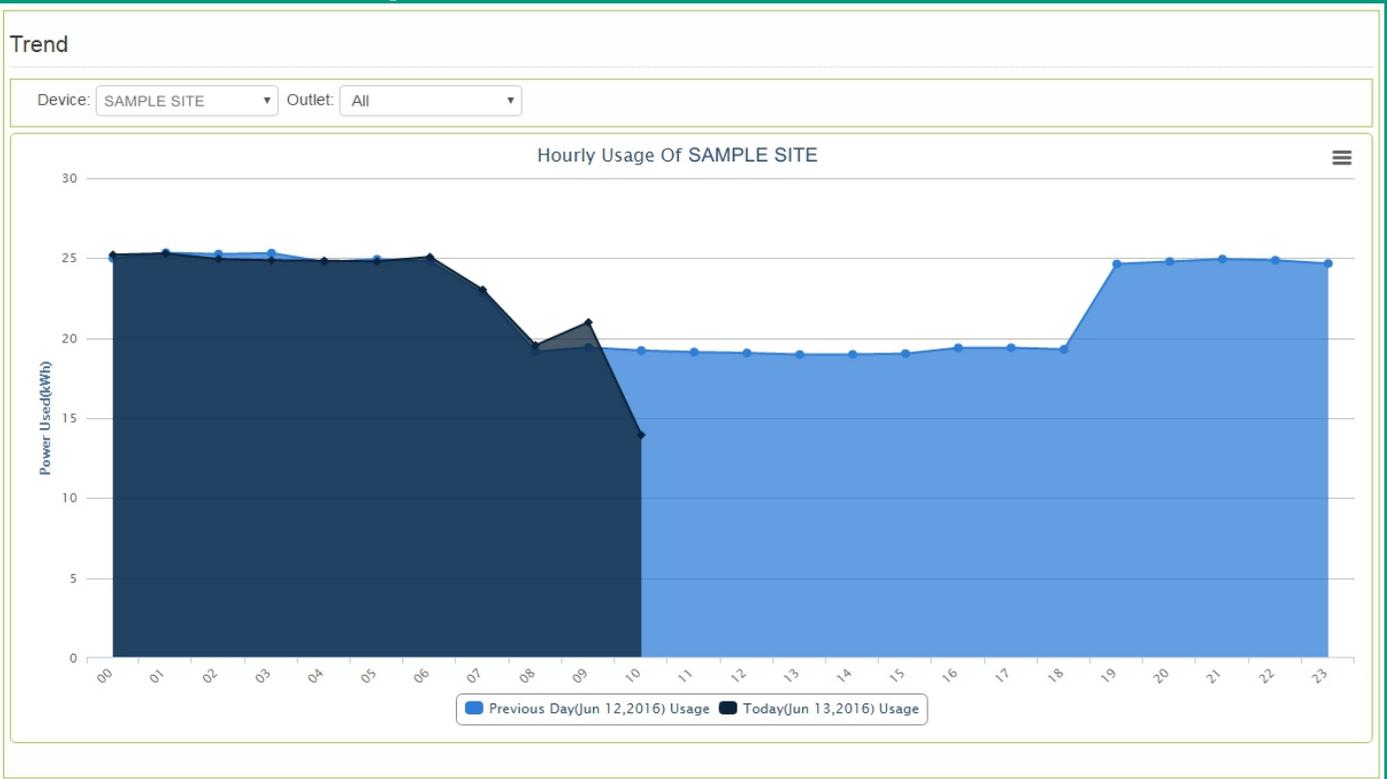
The Trend report shows the hourly usage of all devices. The Trend V/A report shows either the voltage or amp usage of a specific device or any outlet on that selected device. Usage can be reported for a customizable timeframe and interval.

Load (type or usage):
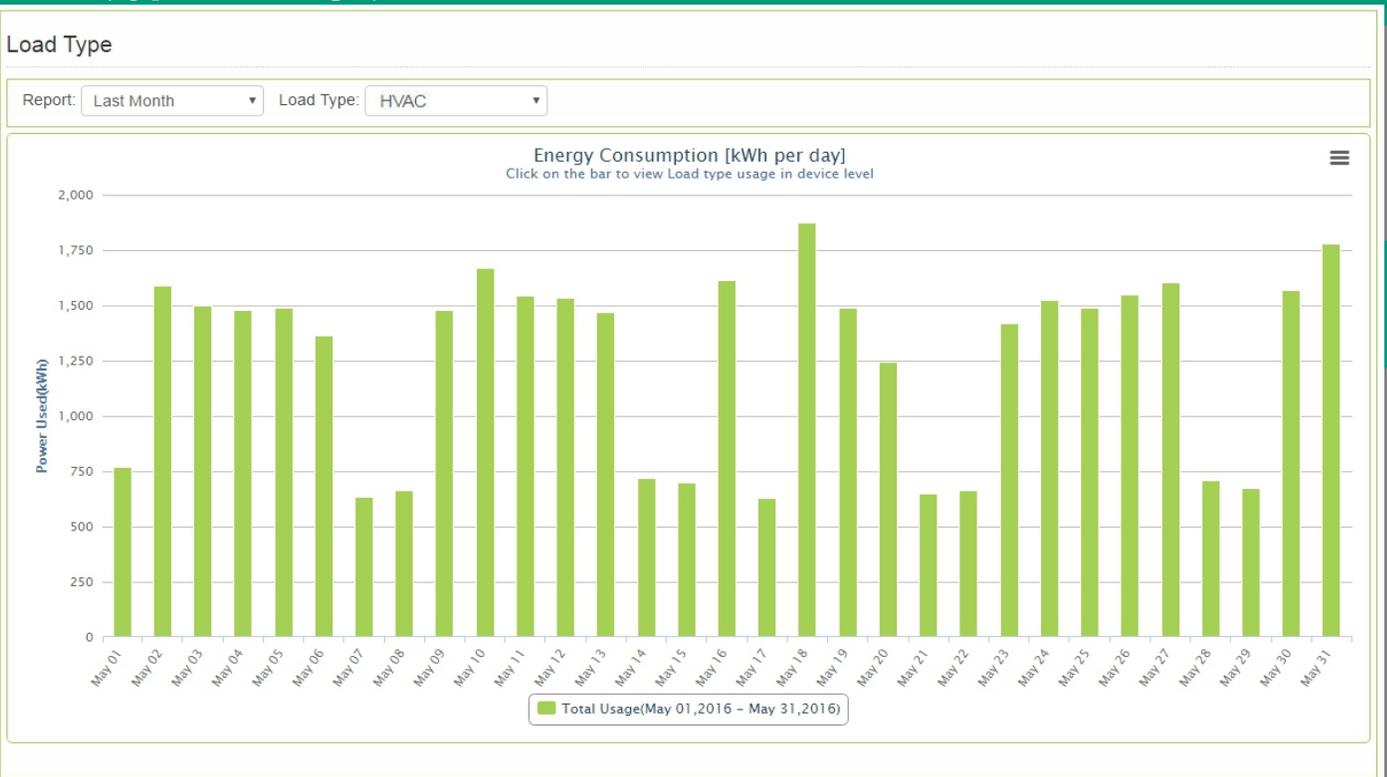
The Load Type report provides usage information for all Load Types, (e.g. HVAC, or Lighting), while a Load Type Usage report displays detailed usage information for a specific load type.

Demand Usage:
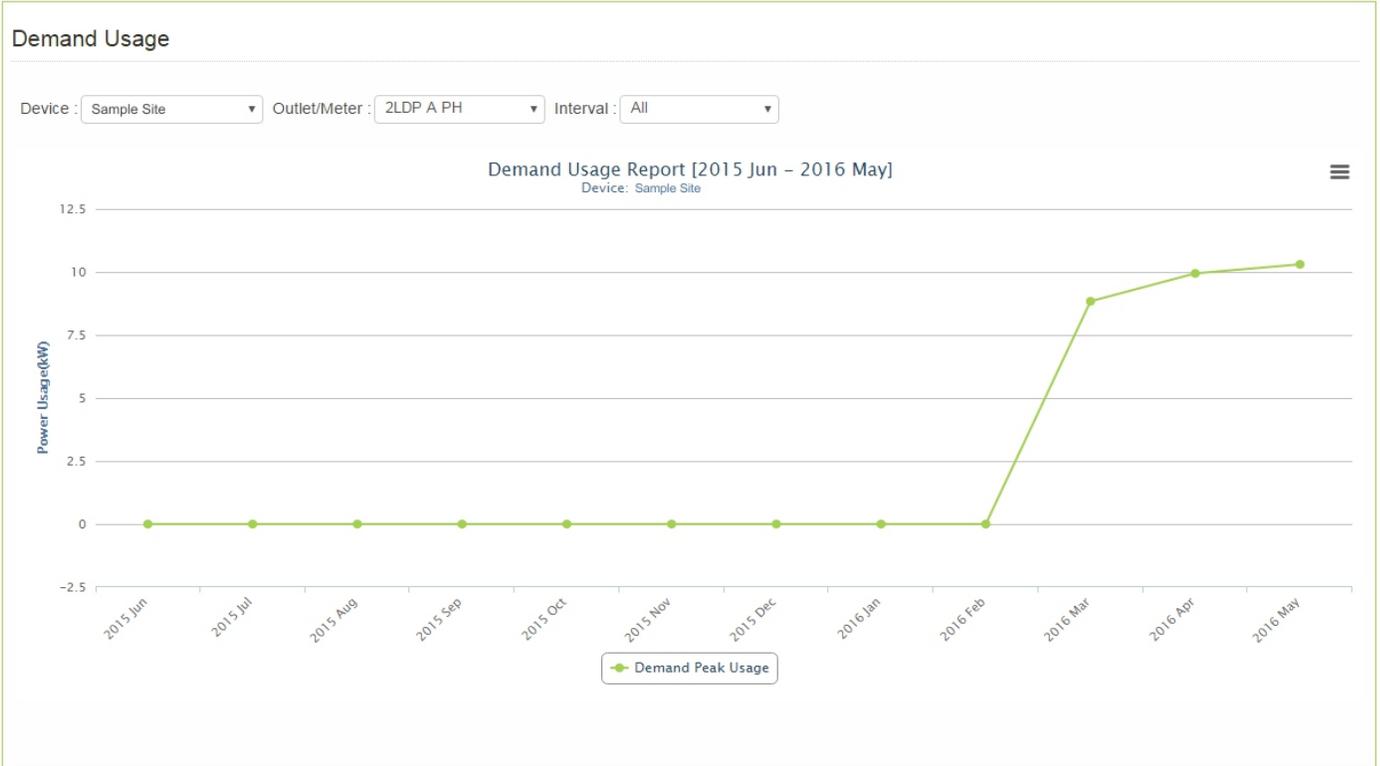
The Demand Usage report shows peak usage by device. Calculated from the peak demand baseline, excessive power use is shown as it directly affects utility billing and can be a key in adjusting usage patterns and cutting costs.

Tenant Billing:

With the optional Tenant Billing capability, the system will generate utility bills according to the rates of the specific utility serving the building. This allows for fair and accurate allocation of costs.
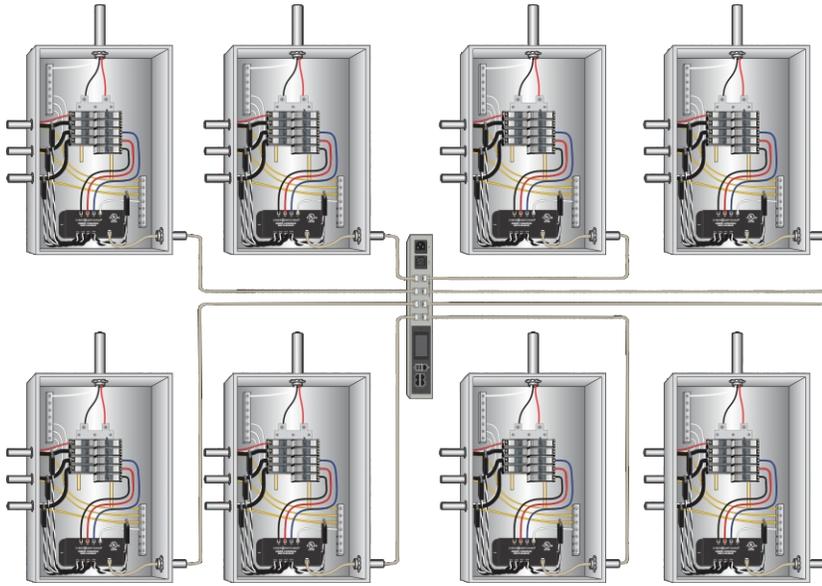
Building the System

The CS-400 system is based on a modular design. As noted previously, there are three primary components: the Submeter, the Hub, and the Gateway. The Submeters are UL Listed ® so that they may be field installed into a new or existing electrical panel. The Submeters include 14-gauge sensing wires and can be connected to circuit breakers and CT-Coils in the panel. With the voltage sync capability, a minimum amount of wiring connections are needed. This reduces installation cost and complexity and increases system safety.

The Hubs are designed to be mounted outside the panels, with a connection to the Submeter module done with low voltage Cat5 or Cat6 cabling. This adds to the ease and safety of the installation. The Gateways are also mounted outside the panels and connect to each Hub with standard Cat5 or Cat6 cabling.
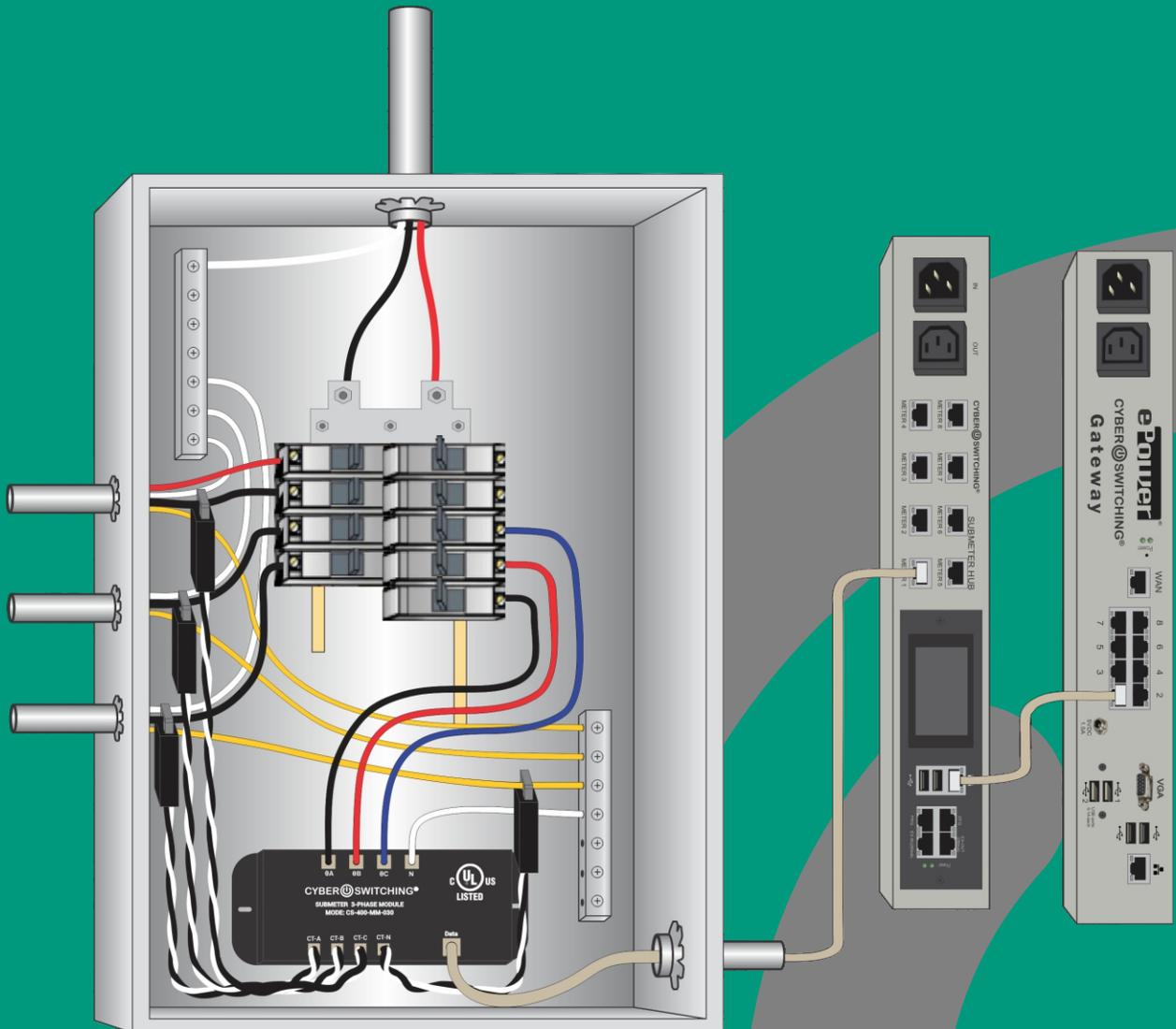
Scaling the System

The modular design of the CS-400 series makes scaling the system simple and cost effective. Each Submetering Hub supports up to eight individual Submeters, whether the meters are in a single large panel or in separate panels, as shown to the left.

Each Gateway supports and provides manageability to up to 7 hubs. This equates to up to 56 meters if the hubs are fully populated, as shown to the right. The Gateway then provides a management portal to give facility managers and system administrators the ability to monitor the power use of every Submeter connected through the Hubs to the Gateway.
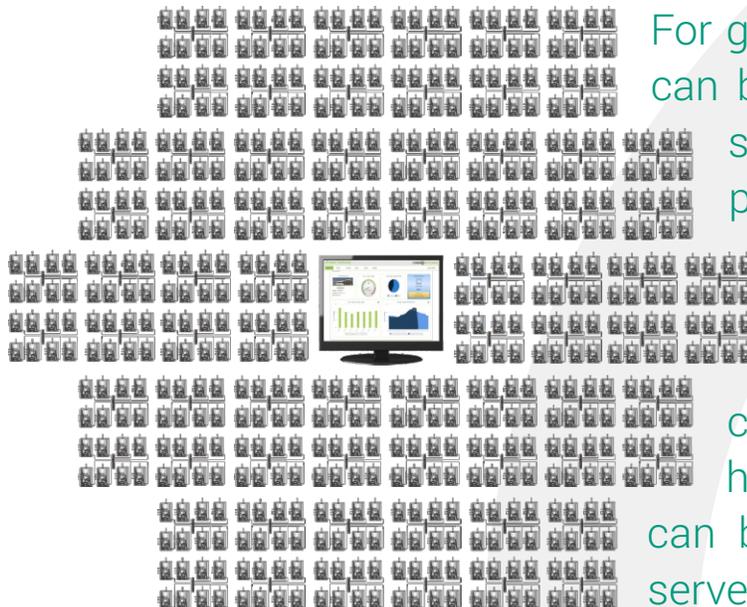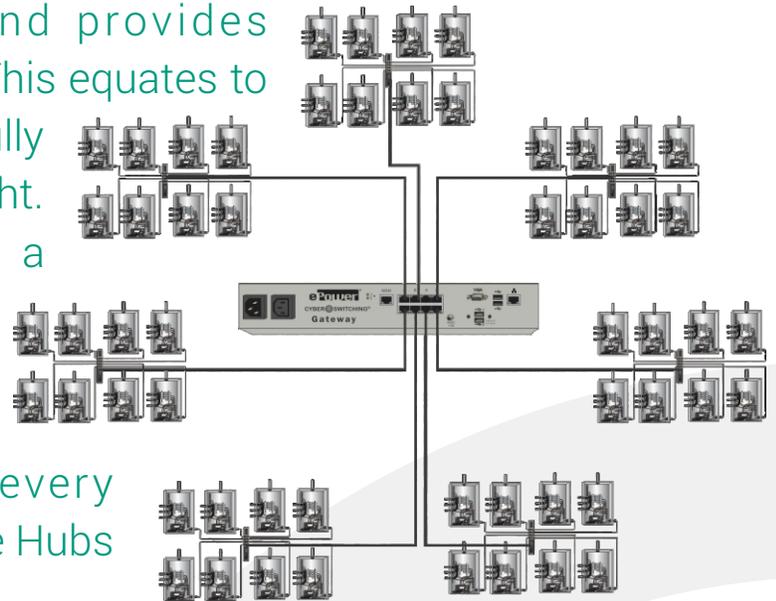
For greater scale, a networked server can be used with the EMC software suite installed. The EMC suite provides the same monitoring and reporting capability as the Gateway, but on a larger scale. The system is designed to communicate so that hundreds of hubs, and thousands of meters can be connected to a single EMC server. Now that's scalability!

CYBER SWITCHING®

Power Submetering

Thinking Green: California's Title 24

The California Building Standards Commission created standards, referred to as Title 24, to promote energy efficiency in commercial buildings. In the latest release of these energy standards, several very stringent metering and monitoring requirements have been put into place, with provisions requiring the separate reporting of HVAC, interior and exterior lighting, and plug loads.

Allowable limits for sensors, controllers, lighting, and dimmers have been mandated by Title 24. It is essential to gain vital information on energy readings and Cyber Switching submeters achieve that. Flexibility, reliability, and real-time reporting make using the submeters an important part of compliance and building management. With good information comes the wisdom to manage energy use.

Cyber Switching's smart submetering solutions provide the cutting-edge technology to meet these Title 24 mandates. Ease of installation with real-time monitoring of vital data points make Cyber Switching submeters an ideal choice for optimum facility management.

Scalability and future expansion is a snap with the submetering modules. The required monitoring is achieved through sophisticated recording and reporting back to a centrally located dashboard. Compliance requirements for tracking and retaining historical records of energy use are included in the feature set. Optional software modules can also accommodate tenant billing.

While today's needs focus on code compliant monitoring, tomorrow's objectives will emphasize power quality and reliability. With an eye on the future, Cyber Switching is motivated to provide technical solutions to enhance and utilize the earth's precious energy resources while improving a company's bottom line.

The Cyber Switching Submetering Solution provides a platform that embraces the entire spectrum of energy performance, from efficiency to reliability and quality.

Product Specifications

FEATURE	TECHNICAL SPECIFICATION
CS-400-MM-030 CS-400-MM-060 Submeter Modules	
Rated Voltage	120-480Vac; Three Phase or Single Phase 50/60 Hz
Certification	FRTZ E4070543; UL 916, Energy Management Equipment, CAN/CSA C22.2 No. 61010-1-12
Accuracy	Calibrated to better than +/- 0.2% from 1% to 100% of rated load
CS-400-SH-3P CS-400-SH-MP Submeter Hubs	
Unit Input Voltage	120-240 VAC, 1.5A
Certification	NEWGQ E206903-A29; UL 60950-1 2ND Ed, CAN/CSA C22.2 No. 60950-1-07, 2ND Ed, 2014-10
Ethernet	10/100 Mbps; DHCP or Static IP
Communication	SNMP V2, SNMP V3, TCP/IP
CS-400-SG-200 Series Submeter Gateways	
Unit Input Voltage	120-240 VAC
Certification	UL 60950 Listed
Embedded Processor	Intel ATOM 64-Bit Dual Core N2600 1.6 GHz
Memory	2GB RAM
Hard Drive	500 GB
Encryption	SNMP V3, SSL
Ethernet Router	8-Port Integral; WAN; DHCP/Static IP; Firewall/NAT; Port Forwarding; DMZ; UPnP

Ordering Information

PRODUCT #	PRODUCT DESCRIPTION	PRODUCT #	PRODUCT DESCRIPTION
CS-400-MM-030	3-Phase Smart Submeter Module	CS-400-SH-3P	3-Phase Submeter Hub
CS-400-MM-060	Mulitpoint Smart Submeter Module	CS-400-SH-MP	Multipoint Submeter Hub
CS-400-CT-050	Split Core CT Coil, 50 amp	CS-400-SG-200	ePower Gateway with EMC, 200 points, and 1 year support & s/w upgrades
CS-400-CT-100	Split Core CT Coil, 100 amp	CS-400-SG-200R	ePower Gateway, 1 year package EMC support & s/w upgrades, renewable
CS-400-CT-300	Split Core CT Coil, 300 amp	CS-400-SG-200TB	ePower Gateway with EMC Tenant Billing, 200 points, 1 year support & s/w upgrades
CS-400-CT-600	Split Core CT Coil, 600 amp	CS-400-SG-200TBR	ePower Gateway, 1 year package, with EMC Tenant Billing, 200 points, renewable

Learn more at www.cyberswitching.com
or call us at 888.311.6277

1921 Ringwood Avenue
San Jose, CA 95131

CYBER ⏻ SWITCHING®
Your Power. Managed Your Way.