



The leading choice for power distribution and management

## The True Savings of the Cyber Switching ePower PDU

### INTRODUCTION

With rising energy costs and the high overhead costs of running a data center, data center managers and facilities managers are looking at every possible way to save money. These same managers are looking now at saving money through proper energy management and energy management equipment. Companies want the best value on their equipment. In addition, they want the equipment to last as long as possible.

However, companies sometimes focus on the up-front costs of purchasing equipment and may not consider the long-term cost savings. A five-year view when purchasing equipment and its long-term savings for the company can result in significant bottom-line impact.



Based on a Silicon Valley Leadership Group (SVLG) study<sup>1</sup>, companies adopting available technology resulted in considerable savings, with a typical ROI achieved within 12 to 18 months.

This paper will examine the Cyber Switching ePower power distribution unit (PDU) from a holistic view and will demonstrate how this product supports the SVLG study. This paper will consider a one-year and a five-year timeframe and will examine three key features of ePower

- Individual Outlet Monitoring<sup>2</sup>, Automated Demand Response, and Cyber Breaker<sup>3</sup>. This paper will demonstrate the powerful benefits and savings that ePower can provide to any company.

#### Individual Outlet Metering

The ePower PDU features Cyber Switching's patented Individual Outlet Metering which provides accurate real-world metering for each individual outlet. With power measurement accuracy at 2% or better, ePower meets billing-grade metering requirements of most utility companies. This feature is very beneficial for co-location centers, where centers can charge individual customers for the amount of energy used per outlet. No longer utilizing an estimated amount, they can determine the exact amount ( $\pm 2\%$ ) of electricity used for their servers and equipment. For enterprise companies, notably their IT departments, this allows them to charge different departments on the amount of energy used to host specific applications and storage.

For those companies that do not currently utilize Individual Outlet Monitoring, the price and the time required to get power usage information is high. It is typically ~\$250 to send a request to a data center company to send a technician to meter a server. The technician will then use a probe and measure the amount of power usage at that moment and report that specific number. In this manner, there is no context for the power measured. Therefore, it is unknown if the systems utilization was high or low at that particular moment. For a data center of 1 million servers, sending out 100 requests to get various servers metered quickly results in \$25,000 spent.

#### Cyber Breaker®, the Virtual Circuit Breaker

Cyber Switching's ePower features patented Cyber Breaker technology which utilizes software to "trip" an individual outlet or circuit when the amperage exceeds a user-defined threshold. The Cyber Breaker is similar to a real circuit breaker in that if the current through the breaker

exceeds a limit for a period of time, it trips. A real circuit breaker uses a mechanical mechanism, either thermal or magnetic; and a virtual circuit breaker uses an algorithm coded into the control electronics. Therefore, overcurrent conditions are isolated to a single outlet, thereby protecting equipment and reducing downtime. An example demonstrating the cost savings related to Cyber Breaker is shown below.

For this example, we examine a Cyber Switching ePower 400/230V 3Φ PDU versus a similar 400/230V 3Φ PDU from a competitor without Cyber Breaker technology. First we need to state some assumptions we are using for this example:

- 1 server brings in \$22,000 in revenue a year, based on the 2008 financial statements of a large Fortune 500 company indicating \$20 billion of revenue using 1 million servers.
- 1% of total servers are down a year due to an overcurrent issue: 10,000 servers
- 30 minutes of downtime per a server per a year
- A bank of outlets consists of 8 outlets/servers
- When an overcurrent condition occurs on a PDU without Cyber Breaker technology, the bank fails and thus 8 outlets/servers go down.

Total Servers	1,000,000
Revenue per server per year	\$ 22,000
Revenue per server per day	\$ 60.27
Revenue per server per hour	\$ 2.51
Revenue per server per min	\$ 0.04
Server revenue lost for 30 minutes downtime	\$ 1.20

<b>Revenue Loss Due to 1 Outlet/Server Overcurrent Condition (Lower is Better)</b>	<b>ePower with Cyber Breaker</b>	<b>Similar PDU without Cyber Breaker*</b>
Per Rack revenue lost for 30 minutes of downtime**	\$ 1.20	\$ 9.60
Annual revenue lost for 30 minutes of downtime**	\$ 12,000.00	\$ 96,000.00
Total Revenue lost over 5 years due to 30 minutes of downtime **	\$ 60,000.00	\$ 480,000.00

\* Without Cyber Breaker technology when one outlet/server goes down due to overcurrent condition all 8 outlets/servers on the bank go down due to PDU failure

\*\* Assuming annual number of servers down due to overcurrent condition in assumptions

From this example, annual revenue lost due to an overcurrent condition is 8x larger when a PDU without Cyber Breaker technology is installed.

#### **Total Revenue Saved over 5 years with ePower**

Revenue lost without Cyber Breaker	\$ 480,000.00
Revenue lost with Cyber Breaker	\$ 60,000.00
Total Revenue Saved by using Cyber Breaker	\$ 420,000.00

With the ePower and Cyber Breaker technology notice that over a 5 year span; \$420,000 in revenue is saved. That is just under half a million in savings from the prevention of overcurrent conditions affecting other critical equipment. Cyber Breaker technology, available on the ePower, helps companies save money and helps keep mission critical equipment up and running.

#### **Automated Demand Response**

Automated Demand Response, commonly referred to as Auto-DR, is a program designed to link electric utility companies, such as Pacific Gas and Electric (PG&E) in California, Northeast

Utilities, Xcel Energy and many others, with a company's energy management system (EMS). Using utility-generated price or emergency signals, a company can then reduce their energy usage by turning particular systems off based on their priority. When a company subscribes to Auto-DR with an energy company, they become linked to the utility company and their network regularly polls a specific energy utility company signal. If a price activation signal or a brownout signal (i.e. higher energy price due to high usage) occurs, the company EMS will pick it up and then transmit to the products on the network to begin load shedding. High priority systems, such as data storage systems (NAS/SAN) and mission-critical application servers, will remain online, while other lower priority systems, such as infrequently used test equipment and excess cloud servers, can be shut down temporarily. With ePower installed onto the network, data center administrators can set up Auto-DR for each particular outlet on the unit. Therefore, with multiple items per rack, ePower, can shutdown only specific units on the rack and not the entire rack itself during an Auto-DR signal. Cost savings during these events are demonstrated below.

For this example, we again examine a Cyber Switching ePower 400/230V 3Φ PDU and its ability to utilize Auto-DR. First, we need to state some assumptions we are using for this example:

- PDU is operating at full capacity and thus utilizing 11.5kW of power
- During an event, 2% of the power on the rack is shed with the ePower
- 5 events occur during a year
- Utility company incentive program pays \$230/kW for potential savings (amount shed during 1 event) - onetime payment for installation of system
- Utility company incentive program pays \$20/kW for actual amount shed
- 1 million servers in use based on the 2008 financial statements of a large Fortune 500 company
- 30,000 racks are in use, and each rack only needs 1 ePower PDU

#### Rack Power Calculations

Assume 11.5kW ePower at full capacity	11.5 kW
Power shed per Auto-DR event*	0.23 kW
Total power shed per year**	1.15 kW

\*Assuming 2% of power per rack is shed during an event

\*\*Assuming 5 Auto-DR events per year

#### Auto-DR Utility Program Savings

Initial installation incentive/rebate*	\$ 52.90
\$20/kW for total power shed for first year per rack**	\$ 23.00
Savings in first year with Auto-DR per rack**	\$ 75.90
Total Savings in first year with Auto-DR throughout datacenter***	\$ 2,277,000.00
Savings in the next four years with Auto-DR per rack**	\$ 92.00
Total Savings with Auto-DR over 5 years per rack**	\$ 167.90
Total Savings with Auto-DR over 5 years throughout datacenter***	\$ 5,037,000.00

\*Assuming \$230/kW for potential savings during 1 Auto-DR event per rack (one-time payout)

\*\*Assuming 5 Auto-DR events per year

\*\*\*Assuming 1 million servers in 30,000 racks per datacenter

From examining these numbers, one can see considerable savings when enrolled in an Auto-DR program. Over a five-year span, a company can save over \$165 in energy costs per rack. When this is calculated over our entire datacenter example (30,000 racks), this equates to over \$5 million saved. This extra money can go directly back to the bottom line. With the ePower product and its ability to utilize Auto-DR, these significant savings are achieved with no work after the initial setup.

#### Conclusion

**First Year Savings with Cyber Switching ePower**

Individual Outlet Metering Savings	\$ 25,000.00
First year revenue savings with Cyber Switching ePower PDU	\$ 84,000.00
Auto-DR Program Savings	2,277,000.00
<b>Total Annual savings with ePower</b>	<b>2,361,000.00</b>

\*Based on 1 million servers/30,000 racks data center example

**Total 5-Year Savings with Cyber Switching ePower**

Individual Outlet Metering Savings	\$ 125,000.00
5-year revenue savings with Cyber Switching ePower PDU	\$ 420,000.00
Auto-DR Program Savings	\$ 5,037,000.00
<b>Total 5 year savings with ePower</b>	<b>\$ 5,457,000.00</b>

\*Based on 1 million servers/30,000 racks data center example

This paper demonstrated the significant cost savings with Cyber Switching's ePower. Three key features, Individual Outlet Monitoring, Cyber Breaker, and Auto-DR, were used to examine how companies could benefit financially on the short term as well as in the long term. By utilizing these key features, all of which are only found together in ePower, a company could potentially achieve a first year savings of over \$2 million and a 5-year savings of over \$5 million. Instead of looking merely at the cost of the initial purchase, companies must consider the 1 and 5 year outlook; and with a thorough analysis, like those presented in this paper, datacenter and facilities managers will see the benefits in using the Cyber Switching ePower.

<sup>1</sup> Tung, T. (2008) Data Center Energy Forecast. Silicon Valley Leadership Group (SVLG), Accenture Technology Labs, Accenture. Report: Final Report July 29, 2008

<sup>2</sup> Reynolds, C., Silorio, R., Cyber Switching (2009) Method and Apparatus for remote power management and monitoring, U.S. Pat. 7,550,870 B2

<sup>3</sup> Reynolds, C., Reynolds, G., Silorio, R., Cyber Switching (2009) Current Protection Apparatus and Method, U.S. Pat. approved - awaiting final number

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