

Matrix Switch Technology Can Deliver Significant Savings

By Jason Perlewitz



Cutting Energy Costs in Enterprise Data Centers

Every business today is digging deep to find ways of reducing operating costs to remain profitable and enable reinvestment for continued competitiveness. Many are finding opportunities in their data centers, in particular opportunities to employ technology that can significantly decrease their energy consumption and operating costs. Until recently, this may have been perceived as an issue only for facilities managers. However, global economic conditions, mounting pressures on profitability, and other factors have combined to make energy cost containment an issue for all enterprise managers and executives.

Whether an online retailer, financial services company, telecommunication provider, or airline, today's enterprise depends on a network as the essential business backbone. In turn, data centers housing these networks depend on an array of equipment to monitor network performance, troubleshoot problems, and maintain uptime. It's not unusual for an enterprise to support its high-speed network infrastructure with dozens — perhaps hundreds in the case of large data centers in multiple locations — of monitoring and analysis devices, and the resulting energy costs generated by this array of devices are far from trivial.

SOME PERSPECTIVE

According to a study by the U.S. Environmental Protection Agency's (EPA) Report to Congress on Data Center Efficiency, U.S. data centers consumed 61 billion kilowatt-hours (kWh) in 2006 — more than double the amount consumed in 2000 — at a cost of \$4.5 billion. Another report, by the analyst firm IDC, notes that the average equipment rack 10 years ago held seven servers that each consumed an average of 100 watts; the number today is up to 22 servers per rack with power consumption at an average of 400 watts per device. And these numbers are only growing. The EPA acknowledges that under present efficiency trends data center energy consumption could double again by 2011.

Surprisingly, the majority of businesses surveyed by IDC don't know how much power is required per square foot in their data centers, much less the consumption by devices used for network monitoring. But an educated guess says that if the average monitoring device requires 450 watts at full load, then, for example, a major financial services company with 600 monitoring devices deployed in its data centers would consume over 270 kW per hour. At an average cost of \$0.08 per kilowatt-hour, that's significant. And that's only part of the equation.

Cooling is another important consideration. Referring again to the IDC study, data center managers today are simply addressing this challenge by pushing more cold air through raised floors or rearranging equipment in hot/cool zones so that air intakes on certain devices are drawing cool air. They're not focused on reducing the overall thermal footprint of their data centers.

About the Author

Jason Perlewitz is Professional Services Manager at APCON, Inc., Wilsonville, OR. (www.apcon.com). He can be reached at jasonp@apcon.com.



FEWER DEVICES

Many will likely point to more efficient power management and device usage as a way to cut power consumption, but why not simply reduce the number of monitoring and analysis devices? While this suggestion might sound inconceivable, the technology that makes it possible to reduce device count and still maintain 100 percent network visibility is available today. It's called a matrix switch and can be thought as an electronic patch panel controlled by software. It enables the dynamic re-allocation of monitoring equipment, therein significantly reducing the number of devices needed to maintain total network visibility and, in turn, lowering overall power consumption.

Figure 1 illustrates the point. At left, the conventional approach, where each monitoring device is connected one-to-one to a dedicated Layer 2/3 switch. At right, an approach where fewer monitoring devices are connected to a matrix switch, which then connects to the same array of Layer 2/3 switches. This implementation assures the same instant device access as the conventional one-to-one deployment, but does so in a way that utilizes fewer total devices, hence the energy savings.

CASE HISTORY

The financial institution mentioned earlier required a one-to-one ratio for monitoring equipment in its data centers and had an array of 600 devices to accomplish the task. This global financial services firm has multiple data centers both in the U.S. and abroad. Because network performance, monitoring, and security are critical, the company deployed matrix switch technology with two goals in mind.

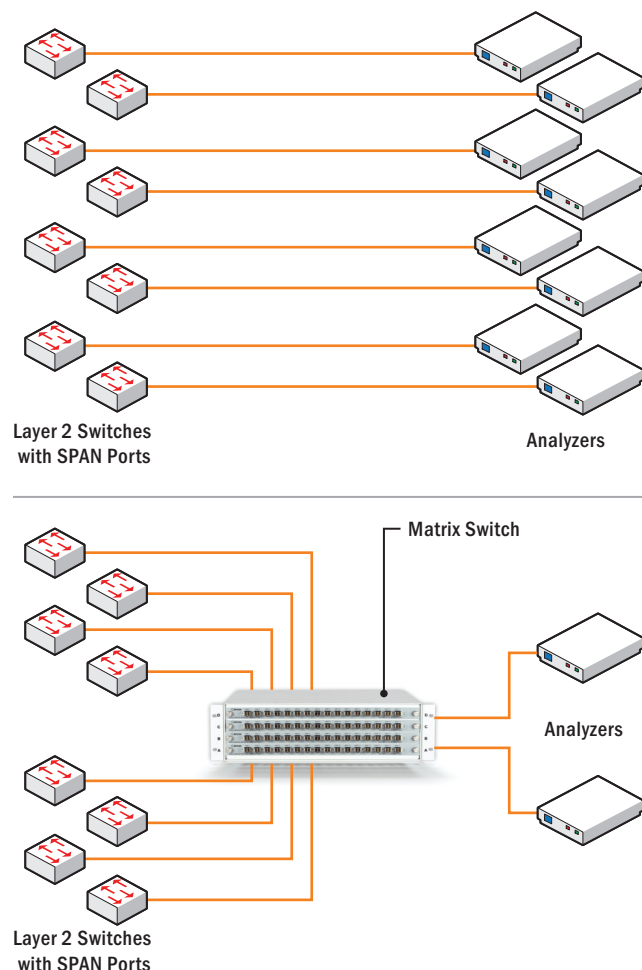


Figure 1. *Electronic device sharing eliminates redundant monitoring devices. Top and Bottom: conventional and more cost-effective monitoring configurations.*

First, performance monitoring enables IT staff to verify that networks are healthy, and secure and that transactions are taking place, meaning business is being transacted as desired. Second, if any portion of the network is experiencing performance issues, the matrix switches enable quick, electronic access to the monitoring devices to help resolve the issue(s).

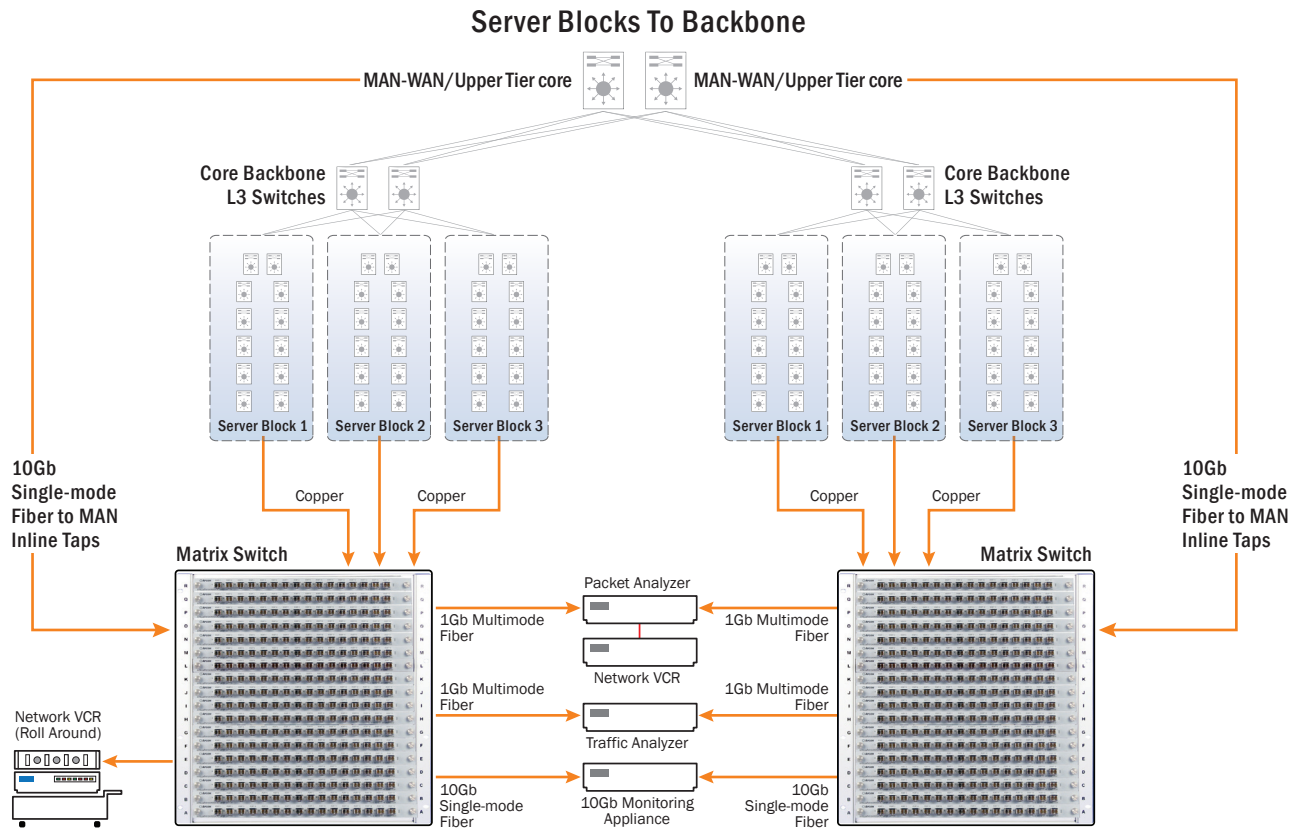


Figure 2. Matrix switching enabled one financial firm firm to manage thousands of critical network segments using fewer overall monitoring tools.

The matrix switch deployment facilitates monitoring of over 4,000 fiber and copper connections – on hybrid 1G and 10G networks – and includes just over a dozen chassis. These high-density switches, featuring 144 or 288 ports each, provide savings in both cost and space over other lower-density systems that would need to be stacked and managed individually – a much more complex and labor intensive process. Additionally, this solution enables this firm to manage

thousands of critical network segments using fewer overall monitoring tools (because the matrix switch technology enables 100 percent network visibility in an any-to-any configuration – instead of the typical and expensive one-to-one ratio for devices (see following illustration). The benefits are lower equipment costs, desired network visibility, better mean time to resolution (MTTR), and as stated earlier, assurance that desired transactions are taking place.

Floor 3

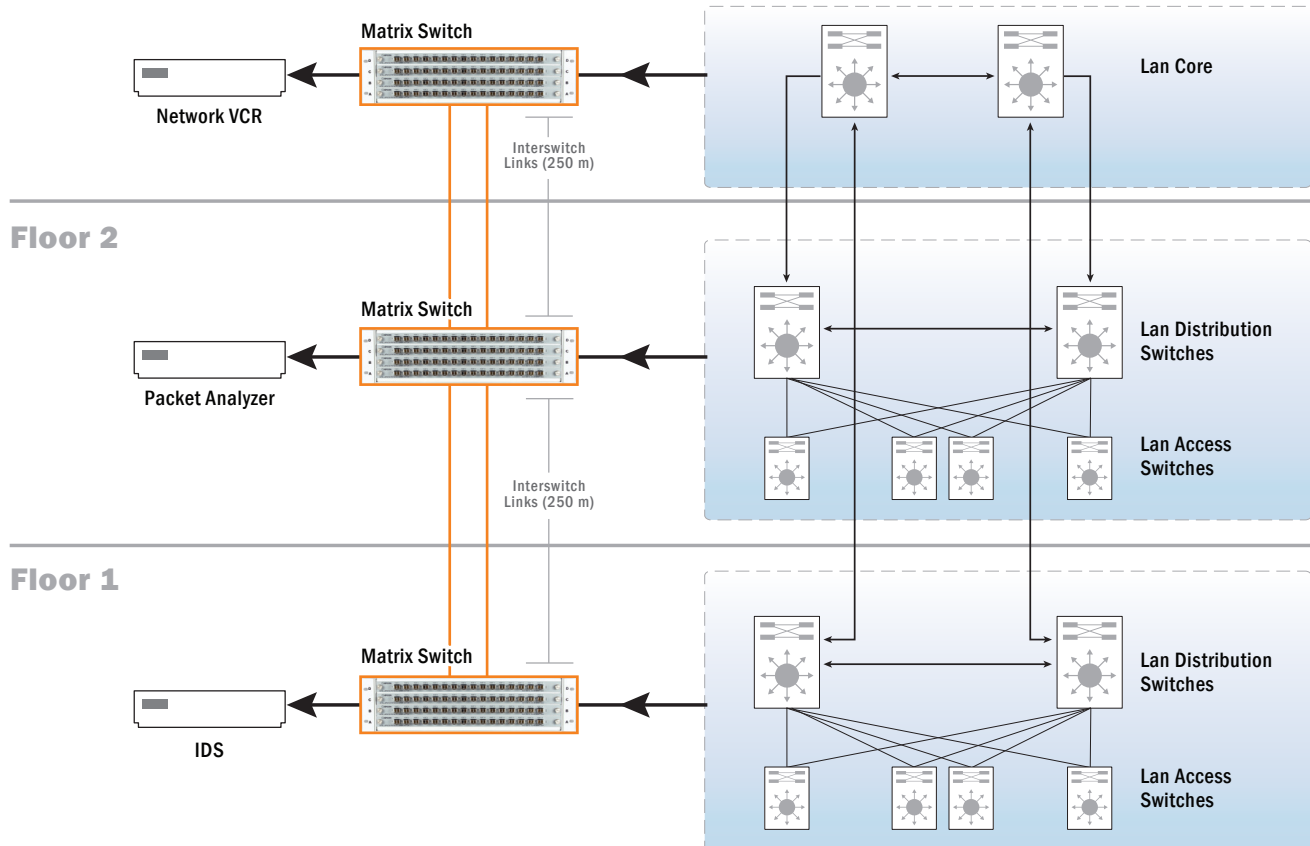


Figure 2. Connecting a device from one network port to another is accomplished with a simple mouse click, and all in a matter of seconds. This is especially helpful when devices are deployed on different floors or in entirely different locations.

Having fewer active devices also reduces the data center’s thermal load, which in turn helps to extend the shelf-life of monitoring devices, cutting down on maintenance and repair costs, and reducing the overall cost of cooling the facility.

“HIDDEN” ENERGY COSTS

There is another significant factor to the equation, the cost of human energy. In a data center that lacks both matrix switches and a one-to-one device ratio, engineers are forced to physically move and re-cable

monitoring devices to diagnose the network problems that arise. This requires the engineer to stop whatever he or she is doing, go to the data center, un-cable and re-cable devices until the issue is located, resolve the issue, and then go to a workstation. Assuming this process goes smoothly, it can take perhaps 15–30 minutes; much longer if the issue is difficult to resolve, the data center has an extensive array of equipment, or is in a remote location.

With a matrix switch deployment in place, however, the network engineer can manage the entire monitoring infrastructure from a remote computer screen and make device changes instantly—and securely—via the software interface. Connecting a device from one network port to another is accomplished with a simple mouse click, and all in a matter of seconds. This is especially helpful when devices are deployed on different floors or in entirely different locations (See Figure 3). Considering the salary of a typical network engineer, the time savings can quickly add up to thousands of dollars. In the case of large enterprises with many network engineers, these manual energy cost savings can be monumental.

The best matrix switches offer network engineers additional time saving benefits that serve to further increase a company's human energy cost savings. Those include:

- A user-friendly interface available via a web GUI that enables users to manage all switch functions intuitively, in familiar two-click fashion. This includes making port patches in both real-time and in batches, setting port properties, customizing port names and being able to import/export settings.
- Embedded user interfaces also eliminate the need to install client software, which is prevented in many enterprise networks for security reasons.

Other important capabilities include the ability to restrict user access to a set of ports or entire switches; and port locking, a security feature that allows authorized users to lock one or more ports or devices for a specified period.