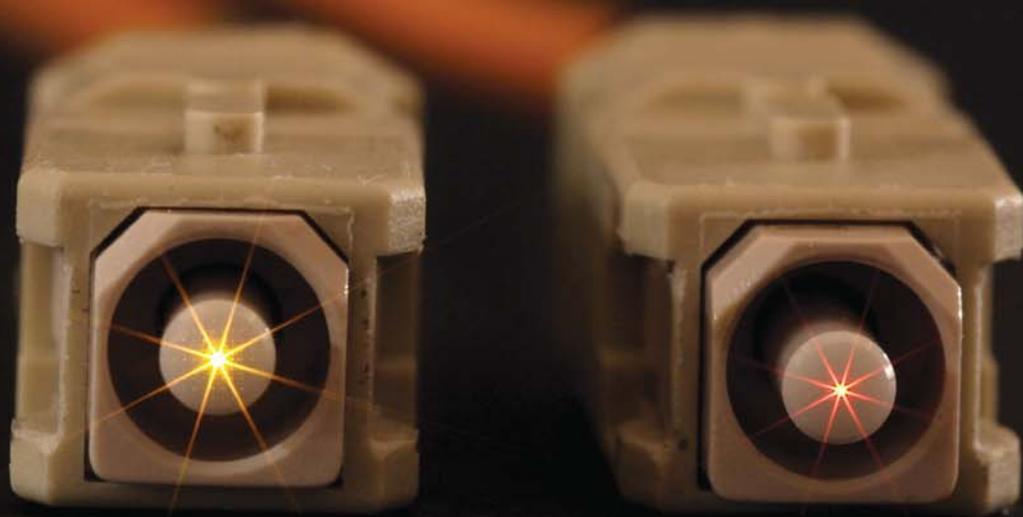


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# Cabling

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## Dos and don'ts of fiber inspection

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Early uptake of FCoE

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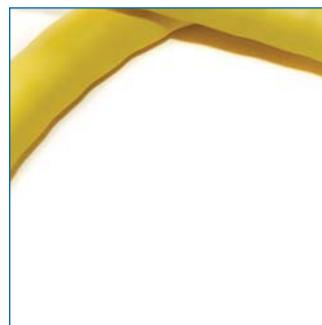
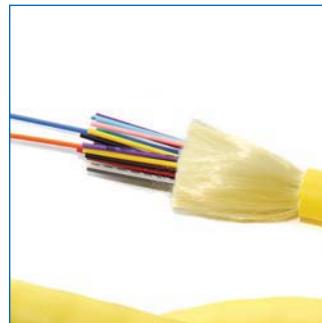
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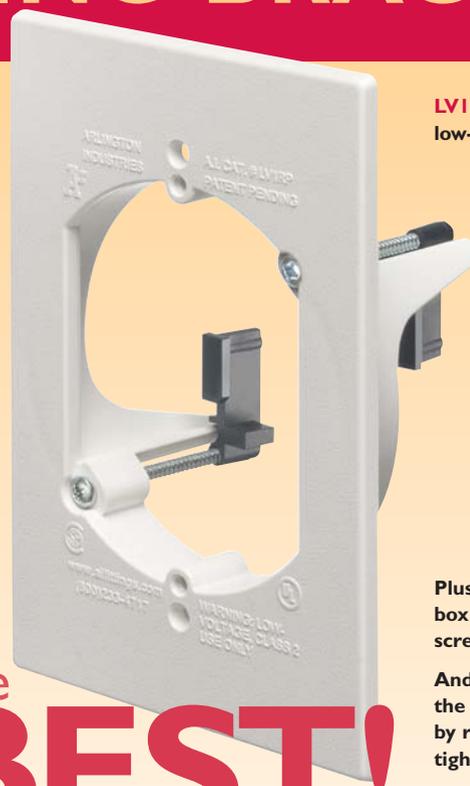
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# Cabling

Installation & Maintenance

DECEMBER 2009 VOL. 17, NO. 12

**ABOUT THE COVER**

Inspecting fiber-optic cables before and after they are installed is a key step in the overall testing process to ensure proper network turnup.

TO LEARN MORE, SEE PAGE 11.

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### 7 Dispelling myths about intelligent-management tools

It's not just for the largest organizations, nor does it have to bust your IT budget. This article takes on four of the most common myths perpetuated about intelligent infrastructure management.

ODED NACHMONI

### 11 Inspection a critical piece of fiber-plant testing

Tools such as fault locators and microscopes are must-haves for technicians commissioning fiber-optic systems in any environment. Make sure you have all the tools you need, and conduct all the necessary checks, before beginning your fiber installation.

JIM HAYES

### 15 Optimizing Ethernet systems in manufacturing plants

In manufacturing environments, downtime can be tracked directly to lost revenue. When building a network for such a site, consider environmental risks and select hardened devices to ensure long-term performance and reliability.

BILL WOTRUBA

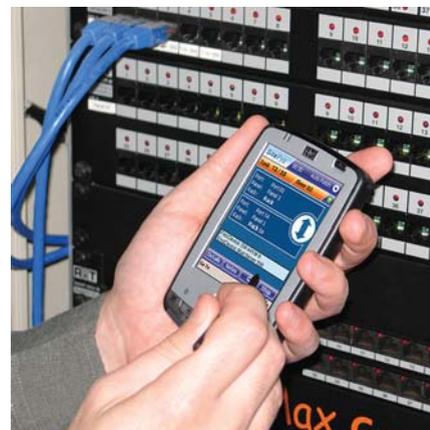
### 21 Data centers slowly shifting to converged networking

Now that the Fibre Channel over Ethernet standard is fully baked, it's time to check in with some real-life users of the technology. Though uptake appears slow, those adopting the protocol know what they'll get from it.

KEVIN KOMIEGA

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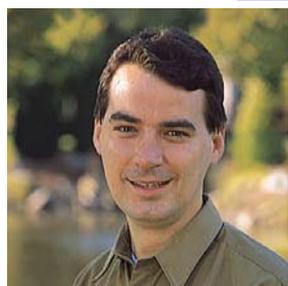
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## EDITORIAL

## More than 10-Gig on twisted pair?

**R**ecently we hosted a web-cast seminar on the topic of 10-Gbit Ethernet total cost of ownership. If you'd like to check it out, it's available on demand at our Web site, [www.cablinginstall.com](http://www.cablinginstall.com).



The seminar covered many aspects of 10-Gbit Ethernet networking and cabling—some of which may be familiar to you and some of which

may be new. Its purpose is to provide you with information that you can use in the planning stages for an upgrade to 10-Gbit Ethernet.

An interesting thing happened during the seminar's question-and-answer period. One audience member, apparently not content to keep the conversation down to the 10-Gbit level, asked about media choices for 40- and 100-Gbit Ethernet. One of the panelists accurately pointed out that the Institute of Electrical and Electronics Engineers (IEEE) 802.3ba specifications covering 40- and 100-Gbit Ethernet are fiber-exclusive. One can discuss singlemode or multimode choices, but if you're going to deploy a network based on the 802.3ba specs, you'll be using optical fiber as your transmission medium.

Another panelist pointed out, also accurately, that recent testing has indicated shielded twisted-pair cabling may be a suitable medium for the transmission of 40- and 100-Gbit Ethernet signals.

Both panelists were correct. While

the 802.3ba standard recognizes only optical media, engineering types have been busily working over a long period of time to assess the capability of fully shielded twisted-pair cabling systems to support data rates beyond 10 Gbits/sec. In November 2007 we reported on testing conducted at Pennsylvania State University that researchers said showed 100-Gbit/sec traffic could be pushed over Category 7 cabling for 70 meters. The research group, which included Penn State professor of electrical engineering Mohsen Kavehrad, aimed to continue testing as chip-circuitry evolved, in order to ascertain whether or not 100-meter transmission was feasible.

This past summer, Kavehrad convened a seminar at Penn State to discuss the progress that had been made. The seminar included a group that could be considered "A-listers" of twisted-pair circuitry engineering, including several individuals who liaise with the IEEE's 802.3 groups that produce high-speed networking protocols.

In January, we will deliver further detail about the research and discoveries being made concerning the prospect of 40- and 100-Gbit Ethernet traffic over twisted-pair cabling.

Will copper cabling do it again? I wouldn't rule it out. ✕

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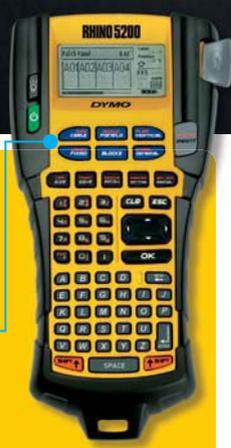


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- Patented PCB-based Smart Plug technology brings unsurpassed performance optimization and repeatability into the patch cord
- Patented/patent-pending Zero-Cross outlet and termination module eliminates pair crossing and pair splitting to minimize internal and alien crosstalk

To learn more about other Z-MAX innovations, attend a Z-MAX™ webinar or view real time termination videos visit, [WWW.SIEMON.COM/US/ZMAX](http://WWW.SIEMON.COM/US/ZMAX)



### Z-MAX™ Smart Plug Technology

Z-MAX cords feature an exclusive RJ-45 Smart-Plug design which integrates a precisely tuned printed circuit board (PCB) into every plug. The PCB-based Smart Plug's enhanced signal tuning is perfectly matched to the Z-MAX outlet, providing unparalleled end-to-end category 6A performance.

### Z-MAX™ Outlets

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Used to terminate both UTP and shielded Z-MAX outlets, the Z-TOOL combines speed, simplicity and connection performance consistency in ergonomically-designed, one-handed tool.

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# Dispelling myths about intelligent-management tools

**D**id you know tens of millions of ports are managed by intelligent infrastructure management (IIM) system? Or that thousands of small to medium-sized organizations have implemented these systems and are successfully using them in their daily business? Did you know the implementation of today's solutions is quick and easy, or that the variety of different solutions currently available make IIM accessible for any size budget?

IIM is the installation and incorporation of intelligent processes to manage infrastructure, together with network devices and service applications. These improved processes consequently result in profitable and continuous business operations. Simply put, IIM enables organizations to manage their IT infrastructure in real time. It further allows key operations to be automated in order to achieve successful, sustainable and fully optimized processes.

When IIM was pioneered it essentially changed the way businesses viewed the infrastructure layer of their network operations. It bridged the gap between the network asset and the necessary task of managing them accurately. Moreover, it turned a cumbersome and often insufferable task into a smooth, highly automated and efficient activity. The introduction of IIM significantly streamlined organizations' business processing, allowing them to reduce manpower, decrease downtime, and speed deployment of services—all within extremely constrained budgets.

The global market for IIM is continuously growing and currently stands at approximately 2.4 million managed ports installed as of 2008, up from 1 million ports installed as of 2005, according to BSRIA's ([www.bsria.co.uk](http://www.bsria.co.uk)) Global Overview of the IIMS Market, October

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**ODED NACHMONI** is vice president of strategy and professional services with RiT Technologies ([www.rittech.com](http://www.rittech.com)).

It's not just for the largest organizations, nor does it have to bust your IT budget.

2008. This figure only reflects real-time IIM solutions, excluding the millions of additional ports worldwide that are continuously being installed for regular IIM solutions. Despite this adoption rate, IIM is often misunderstood and its values remain untapped by many.



Designed for use anywhere at a user site including the data center, SitePro is synchronized with RiT Technologies' PatchView application through a GUI.

Herein we will acknowledge and seek to dispel some of the most common myths about IIM.

**Myth 1: IIM is only for large enterprises and mission-critical organizations, and is expensive.**

**Reality:** IIM's first adopters were large enterprises with mission-critical networks, such as financial organizations and airports. However, all organizations today, including small to medium-size businesses (SMBs) face the same challenges as larger organizations, with their infrastructure requiring full optimization. The necessity to 1) attain lowest total cost of ownership for assets, 2) improve utilization, 3) track IT assets, and 4) pro- ➤

tect sensitive information, is not exclusive to the financial industry or large conglomerates.

Furthermore, research by Mindbranch ([www.mindbranch.com](http://www.mindbranch.com)) reveals that the market for network equipment continues to expand and permeate into companies of every size and industry. Additionally, in a Q3 2009 survey of more than 1,000 IT professionals by Spiceworks ([www.spiceworks.com](http://www.spiceworks.com)), 68% of SMBs reported they planned to add new hardware to their network within the following six months. The majority of survey respondents also intended to spend 37% of their annual budgets on refreshing and expanding their physical infrastructure. With the current economic turmoil, the need to keep the physical infrastructure resilient and secure, and to possess efficient processes to maintain one's competitive advantage, is becoming more apparent to a growing number of SMBs. No matter what the size of an organization, successful management of the network and its infrastructure is imperative for profitable business.

From downtime and impact analysis to asset and change management as well as intrusion detection and reporting, IIM offers a practical solution for diverse networks. In addition, solutions like RiT's EPV or siteWIZ offer affordable and powerful management solutions for all types of organizations. These systems provide accurate and real-time documentation, monitoring, and connectivity management as well as easy management and maintenance of all aspects of the physical layer.

### **Myth 2: IIM is only about patching and cabling management**

**Reality:** A modern IT environment, whether big or small, comprises the following key elements.

The physical IT equipment (servers, switches, PCs, IP phones, printers and more)

The power infrastructure

The cabling infrastructure

The cabinets and supporting equipment

Cooling and environmental monitoring elements

Security elements

Today's IIM solutions are about managing all of the above and more. They are about empowering organizations to implement efficient cross-disciplinary processes that will ensure business efficiency. They facilitate accurate and fast service deployment, and improve asset utilization.

IIM has also been shown to contribute to key elements of business resiliency, which, according to Forrester Research includes business continuity, IT disaster recovery, and information security.

Among its many functions, IIM manages the following.

**Fault management.** Forrester Research recently revealed a trend among IT personnel. The majority of disaster recovery operations were not a result of major catastrophic natural di-

sasters, but rather a result of more mundane events. As a result of continuous monitoring of connectivity at the patching level, some IIM systems provide immediate alerts when sensing any faults or disconnections, providing the exact location in real time. This minimizes network downtime caused by faults in the physical infrastructure.

**Security.** The battle to keep an organization's assets and intellectual property secure is neverending. IIM provides a comprehensive set of security tools that are designed to help organizations succeed in combating suspicious activities. These include real-time identification of illegal or unscheduled connections or disconnections to the corporation's network, identification of unauthorized devices, and more.

**Provisioning and service deployment.** The 21st century has become an age of "anytime, anywhere" connectivity. Today's organizations are more mobile, dynamic, and facing increasing challenges from global competition. As a result, IT staff is confronting endless moves, adds, and changes (MACs). Flawless MAC execution requires accurate information from many fronts such as service availability, infrastructure readiness, virtual local area networks (VLANs), resiliency patterns, and more. Certain IIM solutions streamline and automate MAC planning and implementation, shifting the focus from "how-to-provision" to "what-to-provision," carrying out all complex calculations within seconds.

**IT asset management.** The need for IT asset management is growing increasingly as IT equipment becomes more expensive, critical, and diverse, and is being put through greater government scrutiny. IIM helps today's organizations cope with the constant movement by keeping track of status, attributes, as well as physical locations and movements of these high-value assets. It automatically discovers moves or changes of any IP-driven device such as servers, PCs, and IP phones, and eliminates human error. IIM also maintains other useful information about each device, which is automatically collected and stored as part of its records. Furthermore, IIM includes tools for manipulating, viewing, and reporting data that is critical to successful decision-making.

**Environment and power management.** Escalating power-consumption costs and new environmental legislation have given many businesses cause for concern. Seventy percent of data center professionals were reported to be anxious about the effects of the European Union's new Carbon Reduction Commitment regulations, which are due to start in April 2010. Solutions that add environment, power, and security management to the offering can meet the stringent needs of data centers and large communications rooms. With automatic action capabilities, such a

system acts as an “invisible employee,” monitoring a variety of metrics for business-critical equipment from a single system.

**Myth 3: IIM is too complex and time-consuming, and it requires highly skilled staff to implement.**

**Reality:** Contrary to popular belief, certain new IIM solutions do not demand high levels of skill to operate, making them easier to introduce into organizations and to support on a daily basis. By graphically demonstrating the interaction between all the various entities, IIM actually improves employees’ understanding of the “big picture.” One such example is EPV, a recently introduced plug-and-play solution that is designed to address an organization’s most urgent management requirements.

The EPV is a simple-to-install solution that shows an accurate picture of an organization’s connectivity status, anywhere at any time. It requires no software installation. The user just switches the power on and operates the system. Alternative and additional tools have been introduced such as support for easy and accurate uploading of mass data for larger, more-complex organizations that deal with huge amounts of daily information.

**Myth 4: IIM is only for technical staff.**

**Reality:** Forrester Research believes that chief executive officers and corporate directors can no longer ignore IT issues by relegating them to the chief information officer. George F. Colony, CEO of Forrester Research, commented on his blog, “There is much change being driven by tech in the outside world that the CEO must understand and translate it for the inside. ... Tech is changing your customers and your customers will change your company.”

IIM solutions offer online management tools that enable personnel from various groups to track key performance indicators (KPIs). This provides real-time user-configurable KPIs, early-warning indicators, real-time analysis and alerts, and guided drill-down capabilities to pinpoint the root cause of a problem. It is the ideal solution for top management to easily be able to maintain vigil of their organization while enabling fear of the “IT monster” to be dispelled.

IT managers play a key role in achieving business success and resilience. In order to maintain stability and help an organization flourish, it is essential that the IT manager provides maximum business continuity. This entails weathering storms from all fronts. With inefficiencies only intensifying as IT complexity grows, IIM offers organizations, both large and small, a real-time cost-effective solution. This frees IT managers from unnecessary, time-consuming tasks so they can concentrate on other, more critical matters. ⓧ

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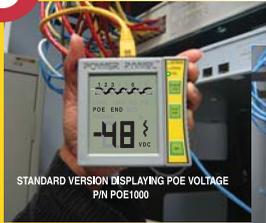




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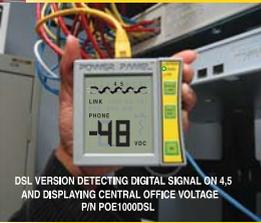
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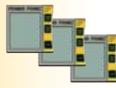
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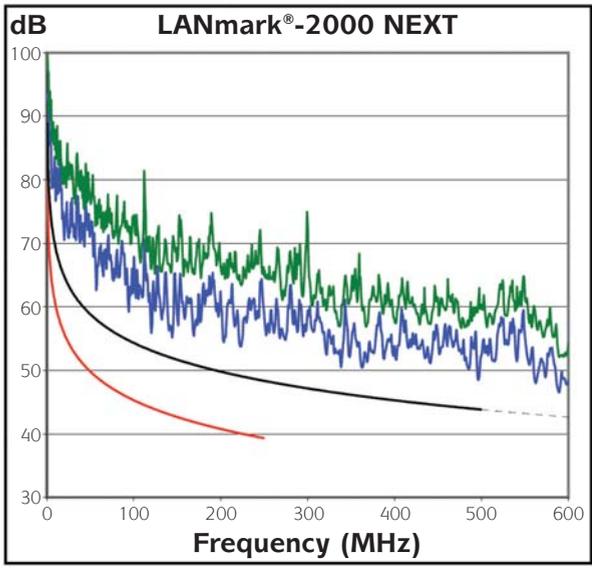


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# Inspection a critical piece of fiber-plant testing

**A**fter all the cables in a fiber-optic network are installed, spliced, and terminated, they must be tested. For every fiber-optic cable plant, you need to test for continuity and polarity, end-to-end insertion loss, and then troubleshoot any problems on every fiber in every cable. If it's a long outside-plant cable with intermediate splices, you will probably want to verify the individual splices with an optical time-domain reflectometer (OTDR) test also, because that is the only way to ensure that each splice is good. If you are the network user, you may also be interested in testing transmitter and receiver power, as power is the measurement that tells you whether or not the system is operating properly.

Testing is the subject of the majority of industry standards, as there is a need to verify component and system specifications in a consistent manner. Most of the tests in fiber-optic standards that come from the Telecommunications Industry Association (TIA; [www.tiaonline.org](http://www.tiaonline.org)) and the International Organization for Standardization (ISO; [www.iso.org](http://www.iso.org)) relate to manufacturing-testing, to verify component performance; they are not relevant to installation testing.

Perhaps the most important test is insertion loss of an installed fiber-optic cable plant, performed with a light source and power meter (LSPM) or optical-loss test set (OLTS). The test is required by all international standards to ensure the cable plant is within the loss budget before acceptance of the installation.

Testing fiber-optic components and cable plants requires making several tests and measurements. Some tests involve installer inspection and judgment, such as visual inspection or tracing, while some use sophisticated

Tools such as fault locators and microscopes are must-haves for technicians commissioning fiber-optic systems in any environment.



Depending on the source of light coming from a fiber, it may or may not be safe to look directly at the fiber. Light from a VFL may be hazardous.

ed instruments that provide direct measurements. Optical power, required for measuring source power, receiver power and, when used with a test source, loss or attenuation, is the most important parameter. It is required for almost every fiber-optic test. Backscatter measurements made by an OTDR are the next-most important measurements, especially for testing outside plant installations and troubleshooting. Measuring geometrical parameters of fiber and bandwidth or dispersion are essential for fiber manufacturers, but not relevant to field testing. Troubleshooting installed cables and networks is required in every installation.

This article focuses on visual inspection techniques and the tools available to conduct these inspections. ➤

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**JIM HAYES** is co-founder of The Fiber Optic Association (FOA; [www.thefoa.org](http://www.thefoa.org)). He has more than 30 years' experience in fiber-optic communications. This article is excerpted from Hayes's most recent book *FOA Reference Guide to Fiber Optics: Study Guide to FOA Certification*, published by The FOA.

## Visual tracing

Continuity checking with a visual fiber tracer can trace a path of fiber from one end to another through many connections, verifying continuity, correct connections, and duplex connector polarity. A visual fiber tracer looks like a flashlight or pen-like instrument with a light bulb or light-emitting diode (LED) source that mates to a fiber-optic connector. Attach the fiber you're going to test to the visual tracer and look at the other end of the fiber to see the light transmitted through the core of the fiber. If there is no light at the far end, go back to intermediate connections to find the bad section of the cable.

A good example of how a visual tracer can save time and money is testing fiber on a reel before you install it to make sure it has not been damaged during shipment. First look for visible signs of damage to the fiber on the reel, like cracked or broken reels, or kinks in the cable. During testing, visual tracers help also identify the next fiber to be tested for loss with the test kit.

When connecting cables at patch panels, use the visual tracer to make sure each connection is the correct two fibers. To make certain the proper fiber is connected between the transmitter and receiver, use the visual tracer in place of the transmitter and your eye instead of the receiver to verify the connection. Follow all rules of eye safety when working with visual tracers.

## Visual fault location

A higher-power version of the visual tracer called a visual fault locator (VFL) uses a visible laser that can also find faults. The red laser light is powerful enough for continuity checking or to trace fibers for several kilometers, identify splices in splice trays, and show breaks in fibers or high-loss connectors. You can see the loss of light at a fiber break by the bright red light from the VFL, even through the jacket of many yellow or orange simplex

cables (but not with black or gray jackets, of course).

The VFL's most important use is finding faults in short cables or near the connector where OTDRs cannot find them. You can also use the VFL to visually verify and optimize mechanical splices or prepolished splice-type fiber-optic connectors. By visually minimizing the light lost, you can get the lowest-loss splice. No other method will assure you of high yield with those connectors.

VFLs require a warning on eye safety. They use visible light. The power level is high and you should not look directly at it. You will find

it quite uncomfortable to look directly at the output of a fiber illuminated by a VFL, so when tracing fibers, look to the side of the fiber to see if VFL light is present.

## Connector inspection with microscope

Fiber-optic inspection microscopes are used to inspect connectors to confirm proper polishing and find faults like scratches, polishing defects, and dirt. They can be used both to check the quality of the termination procedure and to diagnose problems. A well-made connector will have a smooth, polished, scratch-free finish and the fiber will not show any signs of cracks, chips, or areas where the fiber is either protruding from the end of the ferrule or pulling back into it.

The magnification for viewing connectors can be 30 to 400 power, but it is best to use a medium magnification. If the magnification is too low, critical details may not be visible. Inspection with a very high magnification may cause the viewer to be too critical, rejecting good connectors. Multimode connectors should use magnifications in the range of 100 to 200x, and singlemode can use higher magnification, up to 400x.

A better solution is to use medium magnification, but inspect the connector three ways.

- Viewing directly at the end of the polished surface with coaxial or oblique lighting

When connecting cables at patch panels, use the visual tracer to make sure each connection is the correct two fibers.

## New FOA book serves as certification study guide

**F**OA Reference Guide to Fiber Optics: Study Guide to FOA Certification, the book from which this article is excerpted, is the newest textbook from The Fiber Optic Association. Compared to its predecessor, Fiber Optic Technicians Manual, the new book has reorganized materials in a manner that, according to author Jim Hayes, makes

them better arranged for reference and training. The book also includes material on fiber-optic data links, fiber-to-the-home, and testing, which were not in the previous publication.

Other new items include chapters on network design and installation, which combine materials that previously were scattered throughout the Techni-

cians Manual. The book is derived from the FOA Online Fiber Optic Reference Guide Web site.

Since it was founded in 1995, the FOA has focused on education and certification. As of mid-2009, more than 230 FOA-approved schools have certified more than 27,000 Certified Fiber Optic Technician (CFOT) students worldwide. 

- Viewing directly with light transmitted through the core
- Viewing at an angle with lighting from the opposite angle or with quite oblique lighting

Viewing directly allows seeing the fiber and the ferrule hole, determining if the ferrule hole is of the proper size, the fiber is centered in the hole, and a proper amount of adhesive has been applied. Only the largest scratches may be visible this way, however. Adding light transmitted through the core will allow you to see cracks in the end of the fiber, caused by pressure or heat during the polish process.

Viewing the end of the connector at an angle, while lighting it from the opposite side at approximately the same angle, or using low-angle lighting and viewing directly will allow the best inspection for the quality of polish and possible scratches. The shadowing effect of angular viewing or lighting enhances the contrast of scratches against the mirror-smooth polished surface of the glass.

One needs to be careful while inspecting connectors. The tendency is to be overly critical sometimes, especially at high magnification. Only defects over the fiber core are generally considered a problem. Chipping of the glass around the out-

side of the cladding is not unusual and will have no effect on the connector's ability to couple light in the core on multi-mode fibers. Likewise, scratches only on the cladding should not cause any loss problems.

The best microscopes allow you to inspect the connector from several angles, either by tilting the con-

connector or having angle illumination to get the best picture of what's going on. Check to make sure the microscope has an easy-to-use adapter to attach the connectors of interest to the microscope.

Video-readout microscopes are now available; they allow easier viewing of the connector endface, and some even have software that analyzes the finish. While they are much more expensive than normal optical microscopes, they will make inspection easier and greatly increase productivity.

Remember to check that no power is present in the cable before you look at it in a microscope, in order to protect your eyes. The microscope will concentrate any power in the fiber and focus it into your eye, with potentially hazardous results. Some microscopes have filters to stop the infrared radiation from transmitters to minimize this problem. ☒

The tendency is to be overly critical sometimes, especially at high magnification.

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# Optimizing Ethernet systems in manufacturing plants

**I**ndustrial Ethernet is trending to be the principal infrastructure choice for plant-floor networks, just as Ethernet has long been the standard communications protocol in business offices. Both are built on the same standards-based networking platform, the Ethernet local area network (LAN) standard IEEE 802.3. The key advantage of industrial Ethernet is that it allows manufacturers to deploy a single platform to enable interoperability in connecting plant-operations to corporate and administrative offices, and the Internet.

This convergence of open, standards-based Ethernet communications between plant and office levels of an enterprise generates advantages for both, including the following.

- Ubiquitous access to real-time data to improve plant operations
- Real-time collaboration, inventory visibility, and production planning
- Shop-floor system integration with enterprise resource planning (ERP) for scheduling, planning, quality tracking, and delivery information
- Reduced total cost of ownership (TCO) due to faster installation as well as less-costly maintenance and upgrades

## Different environments, different approaches

There is a huge difference between installing Ethernet in an office environment where cables, hardware, and connectivity components are sheltered and protected, and installing them on the manufacturing floor. In industri-

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**BILL WOTRUBA** is director of networking and connectivity products for Belden ([www.belden.com](http://www.belden.com)).

Consider environmental risks and select hardened cabling, networking devices to ensure long-term performance and reliability.



A complete, end-to-end industrial solution for manufacturing plants, like this one from Belden, provides high performance, long service life, and seamless interoperability with the administrative office's Ethernet network.

al sites, network components may be exposed to temperature extremes, ultraviolet radiation (sunlight), moisture, oil, chemicals, and other contaminants—all of which can degrade the components' physical integrity and electrical performance, resulting in intermittent outages or even total system shutdown.

Normal plant activities may also pose risk to network components. For example, there may be constant machine movement and vibration, robotic machinery generating spikes that increase electromagnetic interference or radio frequency interference (EMI/RFI), forklifts, and other mechanized vehicles traversing the work floor. These can damage sensitive electronics, and even the best commercial off-the-shelf (COTS) Ether- ➤

net systems are not made to withstand such harsh and hazardous conditions.

The following guidelines are offered to help manufacturers ensure that the plant-floor communications infrastructure is built tough enough to withstand these challenges.

### Consider downtime's real cost

Manufacturers rely on automation, instrumentation, and control data communications to relay signals between machinery, devices, and control systems that activate events on an exacting and predetermined schedule, with little or no margin for error.

Network administrators also require optimal security and manageability so that network availability attains 99.999 percent uptime or better. Yet analysts report that a large percentage of unplanned downtime in industrial operations is caused by network infrastructure problems. According to one such report, fully 72 percent of network faults can be attributed to failure at the Open Systems Interconnection (OSI) Layer 1 (physical media), Layer 2 (data link), and/or Layer 3 (network).

Physical deterioration or electrical failure in critical data transmission components can lead to unreliable network performance and safety issues, and may lead to loss of critical data, system downtime, or even catastrophic failure. No matter what the industry, if a switch, connector, or cabling system fails, the

cost of parts replacement and repair represents only a tiny fraction of the overall costs associated with production downtime.

The indirect costs of Ethernet system failure may include lost productivity, delayed processes, cost of system shutdown and startup, possible lapses in security and safety, and the loss of service to customers relying on the plant's output. These can send total downtime costs soaring to hundreds of thousands, or even millions of dollars. For example, an automotive assembly plant capable of producing one vehicle per minute would stand to lose profits of about \$2,000 to \$3,000 per minute for small-car production, and up to \$8,000 per minute for SUV and pickup-truck production.

### Specify industrial-grade components

In specifying Ethernet physical media, data links, and network hardware for plant-floor installation, it is important to select hardened, industrial-grade components offering rugged construction and durability to provide optimal performance over long service life. High-quality industrial-grade Ethernet products should provide a lifespan similar to that of other automation-system components—typically 10 to 30 years, which is significantly more than COTS products can deliver.

Other factors to consider include the following.

- Conformity with the Ethernet IEEE 802.3 standard

## The value of redundancy: Baked-good manufacturer relies on rugged industrial switches

One example of how redundancy provides value comes from a large, U.S.-based food company manufacturing baked products. The firm upgraded its Ethernet system for plant automation and control with the goal of enabling real-time information flow across the plant and enterprise.

In selecting Ethernet system switches, reliability and redundancy were paramount considerations. If any piece of equipment in the plant's production process were to fail, it is simply too costly to stop the production line and, consequently, any excess product generated would have to be scrapped until the equipment could be repaired.

During the upgrade, the company installed 12 industrial-grade Ethernet switches from Hirschmann to route copper cables out to the equipment floor and human-machine-interface terminals. The

OpenRail and MICE (Mechanical, Ingress, Climatic, Environmental) switches were selected because of their rugged construction and redundant ring topology.

Data path redundancy means that if a switch or media segment were to fail, the ring topology would kick in and reconnect the ring in the opposite direction so the remaining switches would continue to communicate with each other.

Additionally, the switches contain a USB port for backup and restoring the original configuration using an auto-configurator or USB drive. This means damaged equipment can be replaced, and a new switch quickly and automatically configured by inserting the auto-configuration adapter. From this manufacturer's point of view, the investment made in industrial-strength switches can save hours of costly downtime that translates into thousands of dollars of saved revenue. -BW K®



Hirschmann Compact/Modular MS20 and RS30 switches feature speeds up to 1 Gigabit and Ethernet port densities ranging from 4 to 28 ports.

- Mean time between failure analysis
- Mounting options such as DIN rail mounted, rack- or panel-mounted, or devices that bolt securely onto machines
- A small form factor to occupy less space and allow greater density within the limited space of control panels

- Industrial-grade connectivity components, such as IP67- or IP20-rated UTP or STP patch cords, connectors, modular jack-and-plug kits, adapters, faceplates, and surface-mount boxes.
- Industrial-grade Category 5e RJ-45 and Micro (M12) cordsets and patch cords, including high-flex versions.

**Cable and connectivity options**

For the physical media layer, there are a host of industrial-grade products that conform to the Ethernet IEEE 802.3 standard, while resisting the effects of sunlight, volatile temperatures, moisture, and chemicals. Industrial cables will operate effectively in a wider temperature range (-40 deg. C to +85 deg. C) than commercial cables (0 deg. C to +60 deg. C). Selection will depend on each plant’s network configuration and application requirements.

Industrial Ethernet cables and connectivity options include the following.

- Heavy-duty, all-dielectric, indoor/outdoor-rated optical-fiber cabling in singlemode and multimode constructions. Many feature water-blocking agents for added protection in moisture-laden environments.
- Industrial-grade Category 5e and Category 6 cables with heavy-duty oil- and UV-resistant jackets. Some Category cables feature a bonded-pair inner construction in which the conductor insulation of the pairs is affixed along their longitudinal axis to ensure consistent conductor concentricity and prevent performance-robbing gaps between the conductor pairs during installation and use.
- Upjacketed and armored cables for extreme environments.
- Continuous-flex cables designed for use with continuous-motion machines and automation systems.
- Low-smoke/zero-halogen (LSZH) cables, waterblocked, and burial cables.
- Cables designed for use with leading industrial automation networking and communications protocols, such as EtherNet/IP (ODVA), Modbus TCP/IP, ProfiNet, and Fieldbus HSE.

**Switches and hardware options**

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a wide range of options is available. There are products to support both copper and optical-fiber media, and switches capable of data speeds as high as 10 Gbits/sec. At a minimum, all of these components—switches, connectors, and other hardware—should offer robust construction and resistance to high temperatures, vibration, and EMI.

Typical COTS hardware is designed to operate from 0 deg. C to +40 deg. C, while industrial-grade Ethernet hardware operates efficiently from 0 deg. C to +60 deg. C—extendable to -40 deg. C to +85 deg. C. Also, excessive moisture and corrosive chemicals can inflict serious damage to the electronics in commercial switches, whereas ruggedized industrial switches can be securely sealed to prevent ingress of these substances. Conformal coating is also available for humid/moist applications.

Here is a list of hardware components for Industrial Ethernet networks.

- Hardened managed and unmanaged switches, which come in a variety of copper/fiber port configurations, port densities, industry approvals, and mounting options.
- Firewalls to secure and isolate a network while still permitting authorized data communications to pass through. Firewalls with virtual private network capabilities also allow secure, encrypted communications from a remote location through the Internet.
- Wireless access points, clients, and bridges in either DIN rail mount or IP67 enclosure-less housings now also support the faster, more secure, and noise-immune 802.11n standard.
- Related accessories, such as hardened power supplies, small-form-pluggable fiber transceivers, and even software that provides network status, alerts, and control from the automation network's software or programmable logic controller.

### Plan ahead for bandwidth and redundancy

With an ever-increasing number of Ethernet-cabled devices being added in today's automation and control networks, it is an industry best practice to allow for sufficient bandwidth to handle current needs, with additional headroom to accommodate future expansion. This is far less costly and labor-intensive than having to upgrade incrementally over time.

One factor often overlooked when it comes to maximizing network uptime and performance is redundancy, which is also considered an industry best practice, especially in mission-critical applications. Two kinds of redundancy are key to maintaining uninterrupted signal transmission and maximum uptime.

The first is power source redundancy. Specifying switches



Belden offers a full line of Hirschmann networking devices to ensure hassle-free and secure data communications, even under tough environmental conditions.

that have dual power input capabilities means that if one power source fails, the other immediately takes over.

The second is data path redundancy. The daisy-chain network topologies used by many industrial plants to connect automated machinery and devices have one inherent flaw: if any link between two switches fails, the entire system could potentially go down, as the devices on one network segment can no longer communicate with devices in other segments. The solution is to ensure a built-in redundant path into the network topology.

Another trend gaining traction across the industrial sector is specifying network infrastructure components from a supplier capable of providing end-to-end, field-proven Ethernet solutions tailored specifically to end-user applications and environments. As many companies have discovered, taking a “total system” approach can be more cost-effective over the long run in terms of easing maintenance, troubleshooting, and upgrades. And an integrated system typically results in greater reliability in delivering optimal performance, as well as increased peace of mind for those responsible for optimizing network performance day in and day out. ✕®

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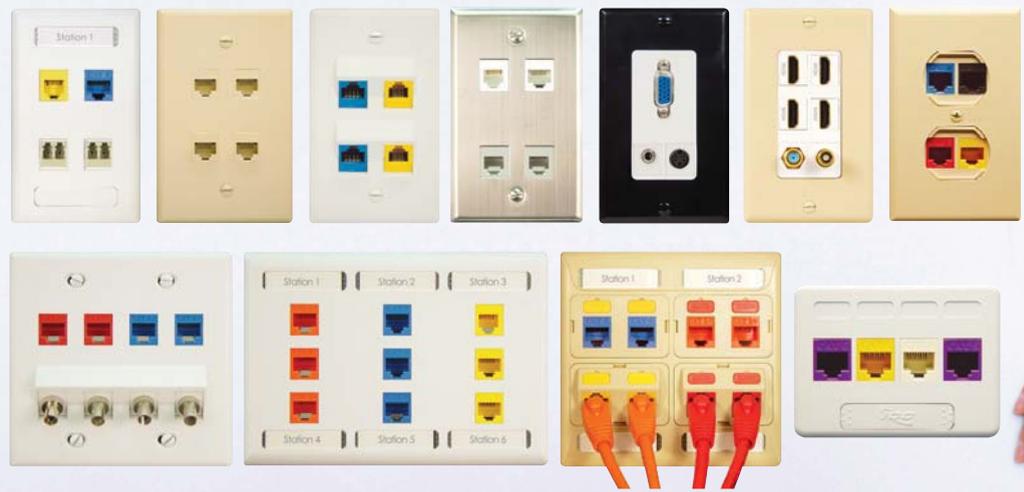
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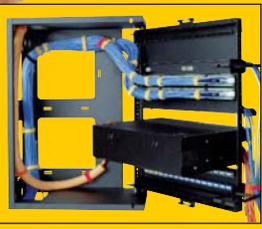
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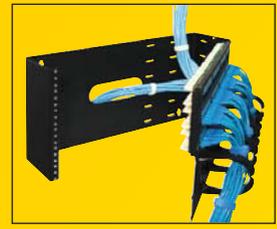
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# Data centers slowly shifting to converged networking

**T**he Fibre Channel over Ethernet (FCoE) standard is fully baked, but user adoption is taking hold slowly. Most IT managers are interested in the concept of moving Fibre Channel traffic over Ethernet networks, but few have so far flipped the switch and put FCoE to use.

The FC-BB-5 working group of the T11 Technical Committee unanimously approved a final standard for FCoE in June of 2009. As a result, the T11 Technical Committee plenary session has forwarded the FC-BB-5 standard to INCITS for further processing as an ANSI standard.

According to the Fibre Channel Industry Association (FCIA), the FCoE products in OEM qualification today are based on the completed standard and users will be able to benefit from standardized FCoE solutions from day one.

But that is the future. Fibre Channel over Ethernet is still in the very early stages of development.

InfoStor magazine, one of Cabling Installation & Maintenance's sister publications, has been tracking FCoE deployment plans closely over the past several months. In a reader survey last April, approximately 9% of respondents say they planned to roll out FCoE in 2009, while 33% of those polled had FCoE deployments in plan for 2010 or 2011. However, the overwhelming majority (58%) says it has no plans to use the technology.

InfoStor posed the same question to readers in October and the results were similar. There has been a slight rise in the number of users planning FCoE this year (13%), but almost 57% are standing pat with no deployments planned.

However, there are a select few organizations ahead of the adoption curve and they are experiencing the benefits of converged networking and the resulting cabling reduction first hand.

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**KEVIN KOMIEGA** is a contributing editor for Cabling Installation & Maintenance and senior editor of InfoStor magazine, which covers storage networking.

Though uptake of FCoE might be slow, those adopting the protocol know what they will get from it.

## FCoE and the next generation data center

One of the few IT professionals on the bleeding edge of FCoE adoption is Kemper Porter, systems manager in the Data Services Division of the Mississippi Department of Information Technology Services.

Designing and building an efficient data center is a top concern for Porter. His department is in the midst of planning a big move to a new data center and expects to be up-and-running in six months. One of the items on Porter's agenda is simplification. Part of that plan includes a transition to converged networking.

"We simply want to clean up when we get to the new building. We know we are going to have a very high rate of growth. We had to set a new precedent and deployment pattern," says Porter.

Porter and his team essentially function as a service provider to various state agencies, provisioning servers and IT resources to application developers across the state.

Porter envisions a massive proliferation of VMware virtual machines (VMs) deployed as building blocks that look and feel like mainframes, all of which connect to centralized storage via converged network adapters (CNAs) with centralized data backups and disaster recovery at the server level.

Converged network adapters consolidate the IP networking capabilities of an Ethernet network interface card (NIC) with the storage connectivity of a Fibre Channel host bus adapter (HBA) via FCoE onto a single 10 Gigabit Ethernet interface card.

Porter is currently using three single-port CNAs from QLogic in conjunction with dual Cisco Nexus 5000 Series FCoE-capable network switches.

The CNAs are being used in a test and development capacity – Porter is waiting until the move to the ➤

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This seminar will examine PoE+ from several perspectives, including standards-level activity, application/hardware developments, and using an installed cabling base for PoE+ deployment.

#### **Presentation 1: The IEEE's 802.3at specifications**

Now that the 802.3at standard is complete, this presentation will discuss the final specifications and what they mean for real-life deployment of PoE+. It will answer questions including: What is the maximum available power via 802.3at? Which devices that 802.3af couldn't support can now be powered through 802.3at? And, what approaches can network managers take to maximize the higher power available through 802.3at?

#### **Presentation 2: TIA addressing PoE+ on copper cabling**

The TR-42.7 Committee of the Telecommunications Industry Association deals specifically with Telecommunications Copper Cabling Systems. One of the committee's current projects is a Telecommunications Systems Bulletin, TSB-184 Guidelines for Supporting Power Delivery Over Twisted-Pair Cabling. This presentation will discuss the progress being made toward the completion of TSB-184, including technical issues that have been resolved and those that are still under consideration.

#### **Presentation 3: Wireless networking—an application driving PoE+**

This presentation will offer an update from the perspective of the wireless-network delivery equipment, including access points. It will describe the capabilities that could benefit from PoE+-level wattage, provide an overview of the extent to which today's wireless gear is incorporating PoE/PoE+, and talk about next-generation capabilities that are making PoE+ “must have” rather than “nice to have” technology.

#### **Presentation 4: Power delivery and media**

This presentation explains why some applications that can benefit from PoE technology can also require the long-distance transmission available through fiber-optic cabling. It then discusses the options available to users who require both PoE and fiber cabling.

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new data center in 2010 to put them in critical roles. He says the move to CNAs is one of necessity.

“When you have a 3U-high server it does not have an integrated switch and you wind up with a proliferation of network cards – six Ethernet connections per server and two for Fibre Channel,” he says. “Having all of these network cards creates a spider’s den of all these cables going in and out of the servers. It creates an excellent opportunity for physical mistakes and makes the process of troubleshooting more difficult.”

Despite his aversion to so-called bleeding edge technologies, Porter is confident that the CNAs with FCoE will meet his future needs.

“There isn’t anybody really using it, but I believe touching it and working with it is the only way to get your confidence up. I would not describe myself as an early adopter. This is just about as much fun as I can handle. If I were not moving to a new data center I probably would not be doing this,” Porter says.

The old way of doing things is a non-starter for Porter. His rack servers can comfortably house 77 VM instances physical server, while maintaining mainframe-like reliability, but none of it would be possible without minimizing network adapters and port counts.

Porter now runs two-to-three connections to each server. “It brings the complexity way down. We will still have our Fibre Channel infrastructure with one connection rather than two per server and we still have redundant pathways because we connect to two Nexus switches,” he says.

Converged networking is the way of the future, at least for Porter. “We will now buy CNAs to put in all of our future VMware servers. That is a fact. The technology is solid enough that we are going that way,” he says.

### Consolidating cabling with FCoE

Salem Hospital is one of Oregon’s largest acute care hospitals and operates the busiest emergency department in the state. As part of a recent data center upgrade, the not-for-profit hospital beefed up its business continuity plans, reduced energy consumption and upgraded its IT infrastructure to accommodate data growth from electronic medical records (EMR) and picture archiving and communications system (PACS).

Heng Him, chief technologist, Salem Hospital, says all of those needs were met using server virtualization in conjunction with 10 Gigabit Ethernet connectivity and CNAs.

The hospital runs a myriad of IT systems, but its newest gear includes a pair of Cisco Nexus 5020 switches with FCoE support. The Nexus 5020 switches connect over lossless 10 Gigabit Ethernet to the hospital’s newer servers, which host multiple healthcare applications and Microsoft Exchange.

The Nexus 5020 separates the storage traffic from data traf-

fic, sending the storage traffic to Cisco MDS-based storage area networks (SANs) and Ethernet traffic to the Cisco Nexus 7000 switch at the core. Another pair of Cisco Nexus 5020 switches connects to existing Gigabit Ethernet servers, by way of Cisco Nexus 2000 fabric extenders.

Through the use of the Cisco networking gear and FCoE, Sa-

“Simplifying the switching platform and wire management also makes troubleshooting much simpler. If you look at our old racks versus the new, it is like night and day.”

lem Hospital reduced the number of cables needed for each server by half, from four to two. In addition, the Cisco Nexus 5020 switches are deployed close enough to the hospital’s servers to allow for the use of relatively inexpensive twinax cabling.

“We cut our cabling and associated costs in half. We are using twinax instead of standard SFP+ cabling, which saves on cost,” he says. “Simplifying the switching platform and wire management also makes troubleshooting much simpler. If you look at our old racks versus the new, it is like night and day. Some [people] look at the new setup and ask where all of the cables are.”

Him says the hospital is also consuming less energy. “It’s clean and easier to manage and there are fewer hot spots. We bring the heat guns in regularly to check. We are experiencing better airflow and cooling now.”

Lastly, the hospital’s staff is spending less time managing separate domains in the data center, freeing them up to work on new projects that directly relate to patient care, including a new fetal monitoring program, a patient alert system and an upcoming Citrix virtualization deployment.

The separate IT teams that historically managed storage and networking have been trained on the Cisco converged networking platform.

Him estimates that his IT department saves up to four hours per day on SAN management. “Our team members can now cross-train and collaborate more effectively,” says Him.

Like the Mississippi Department of Information Technology Services, Salem Hospital plans to virtualize everything going forward with VMs, CNAs and FCoE over 10 Gigabit Ethernet.

“With FCoE we have grown from 50 servers to 300 in the last 18 months. The speeds we have gained from using FCoE allow us to throw virtual servers at every project. We are upgrading almost all of our applications, taking them off of physical servers and putting them on virtual servers,” he says. ✕

# INDUSTRYspotlight

Compiled by Patrick McLaughlin

## Berkeley Lab, Silicon Valley group talk energy-efficient data centers

Researchers at the United States Department of Energy's Lawrence Berkeley National Laboratory ([www.lbl.gov](http://www.lbl.gov)) recently collaborated with the Silicon Valley Leadership Group (SVLG; [svlg.net](http://svlg.net)) to present case studies of energy-efficient data center administration. The SVLG has partnered with the California Energy Commission to encourage group member-companies to demonstrate new or underused energy-efficiency strategies for data centers. Companies including Intel, IBM, Hewlett-Packard, Sun Microsystems, NetApp, and Oracle have participated. Several of these case studies were presented at an October 15, 2009 event called the Data Center Energy Efficiency Summit, hosted by NetApp.

Data centers are one of the fastest-growing energy users according to an EPA study, which was led by Berkeley Lab scientists, the lab stated when announcing the October event. William Tschudi, project manager in the Berkeley Lab Environmental Energy Technologies Division's (EETD) application team, said the following of the efficiency efforts: "These demonstrations are taking place in corporate facilities in Silicon Valley, with major partners, both on the equipment supply and user side. SVLG is trying out different technological approaches, determining which ones work and which don't, and publishing the results so that data center managers can evaluate the case studies and decide what works for their facilities."

### Temperature sensing

One of the case studies presented comes from an Intel data center in Santa Clara. There, the engineering team uses tem-

perature sensors currently deployed in servers to control the ambient temperature in the data center. The goal was to show how to access these sensors and use

"When electricians would go under the floor, they didn't think twice about pulling up ... tiles."

them to directly control computer room air conditioning.

"The temperature sensor data is available on the IT network," said Geoffrey Bell of Berkeley Lab's EETD. "The challenge for this project was to connect the data to the computer room air handler's control system.

"The team developed a control strategy in which the chilled water flow and the fans in the computer room air handlers are controlled separately. Using the existing sensors in the IT equipment eliminates an additional control system, and providing optimal cooling saves a significant amount of energy."

Participants report the project was successful in demonstrating that the temperature sensors within IT equipment can be used to increase the efficiency with which temperature is regulated in a data center equipment room. According to the lab, manufacturers of IT equipment agree that the temperature at the inlet of the server, at the server's front panel, is the figure that should control the operation of air conditioning equipment. In most data centers today, the temperature is measured at the return to the computer room air handler or air conditioner.

Intel collaborated with IBM, Hewlett-Packard, Emerson, Wunderlich-Ma-

lec Engineers, FieldServer Technologies, and Berkeley Lab to install the necessary components and develop the new control scheme. The next step will be to develop

an optimized control system using the internal sensor data as input, which the team hopes could help realize an energy savings of 30 to 40 percent of a data center's cooling energy.

### Software-driven solution

Another success story from Berkeley Lab and SVLG comes from the California Franchise Tax Board's data center in Sacramento. Lab researchers worked with data automation software and hardware (DASH) control systems, as well as a wireless sensing network from Federspiel Controls, to demonstrate how dynamic data center cooling can save money.

The control system uses wireless sensors and Web-based software to control computer room air handling units. The DASH software could dynamically turn off 6 to 8 of the 12 cooling units while ensuring that inlet air temperatures were within the recommended temperature range.

Other energy-reducing measures included rearranging floor tiles, installing variable-frequency fan drives, and installing blanking panels to contain hot air in the aisles between equipment racks. All these measures are in a guide to best practices for data center energy efficiency developed by researchers from Berkeley Lab. ➤

Those working on the Franchise Tax Board's data center made these changes incrementally to compare the effect of each measure on energy performance. Overall, they report, the project saves more than 475,000 kilowatt hours per year, which is 21.3 percent of the facility's baseline total energy consumption. The DASH system saved 15.2 percent with a payback time of just under one year after rebates. Overall the energy reductions eliminate more than 40 tons of carbon-dioxide emissions per year. The total project, including best practices, saves close to \$43,000 annually and cost \$134,000 for a payback time of 2.25 years after rebates.

#### Collocation case study

At the October 15 summit, James Kennedy, senior facility manager at Sacramento hosting facility RagingWire Enterprise Solutions, presented a case study of the measures taken at his facility. RagingWire currently has a single facility, with another one under construction and a third soon to break ground, according to Kennedy. In his presentation, entitled "Maximizing cooling efficiency in a concurrently maintainable and fault-tolerant data center," Kennedy emphasized that every energy-efficiency measure he took had to meet RagingWire's reliability and redundancy requirements.

He also emphasized that it was important for him to be able to make measurements dynamically, because as a hosting facility RagingWire consistently deals with customer move-ins as well as changes with existing customers. The company found a wireless sensor system from SynapSense fit its needs, particularly for improving its ability to monitor static pressure under the data floor.

RagingWire's 200,000-square-foot facility has a four-foot raised floor served by 154, 30- and 40-ton computer room air handling units. By incorporating such measures as sealing the data floor including power-distribution units and

unnecessary holes, as well as the use of cold locks, RagingWire raised the average static pressure from 0.06 to 0.115 inches across the floor.

"Everyone should install monitoring," Kennedy said during his presentation. "Seal the raised floor. Maintain static pressure under the floor," he continued. "Once we sealed holes and equipment on the floor, we doubled our static pressure."

The floor-sealing initiative meant changes not only in equipment and monitoring, but in personnel practices as well. As a hosting facility, RagingWire has many individuals working in its facility from time to time. "When electricians would go under the floor, they didn't think twice about pulling up three, four, or five tiles," Kennedy said. Such disruption of under-floor static pressure wreaks havoc on cooling efforts.

RagingWire also installed chimneys atop computer room air handlers. "We have 32-foot ceilings," Kennedy explained. The chimneys raised the top of the air handlers from 6 feet to 12 feet, and raised the CRAC intake temperature by 5 degrees Fahrenheit. The SynapSense sensors played a role in this part of the project as well. "The wireless sensors are pretty easy to place in the roof," Kennedy said. "We know what the thermodynamic layers look like, and have 12-foot versus 6-foot returns.

"The goal should always be getting as hot air as possible back to your CRA-CUs," he concludes, and the wireless sensors helped RagingWire achieve that objective.

Berkeley Lab's collaboration with SV-LG and participation in the demonstration projects is funded by the California Energy Commission's Public Interest Energy Research program. Berkeley Lab is a U.S. Department of Energy national laboratory. It conducts unclassified scientific research and is managed by the University of California for the Department of Energy Office of Science. ⓧ

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# New Products

Compiled by Patrick McLaughlin

## Gig-speed PoE media converter

The OmniConverter GPoE/S media converter is a 10/100/1000 UTP to 100Base-FX or 1000Base-X fiber multi-port media converter; according to the manufacturer, it is the first such device on the market to support the IEEE 802.3at (PoE+) standard. Classified as power sourcing equipment (PSE), the OmniConverter GPoE/S provides power to one or two powered devices (PDs) using standard unshielded twisted-pair cables that carry the Ethernet data. The GPoE/S can power a variety of IEEE-compliant and non-IEEE-compatible powered devices, such as IP phones, wireless access points, and network cameras. The GPoE/S is available in models that support both the IEEE 802.3af standard and the 802.3at (PoE+) standard. 802.3af models provide up to 15.4W of power per UTP port. The higher-powered 802.3at models provide additional power of up to 25.5W per port for more demanding PDs such as LCD panels, pan-tilt-zoom IP cameras and 802.11n wireless access points. A variety of port configurations are available, including single or dual UTP and small-

form-pluggable (SFP) ports. Models are also available with redundant SFP port option for critical applications that require protection and sub-50-ms restoration in the event of a fiber failure. The standalone GPoE/S comes in a compact form factor, which can be tabletop mounted, wall mounted, or DIN-rail mounted using an optional DIN-rail mounting kit. The product is DC powered and available with an optional external 100 - 240VAC universal power adapter.

**OMNITRON SYSTEMS TECHNOLOGY**

[www.omnitron-systems.com](http://www.omnitron-systems.com)

## Fiber modules for optical testing

The FiberTEK FDX Fiber Optic Modules are designed to extend the capabilities of the LanTEK II cable certifiers from certifying copper-cabling links to the certification of multimode and singlemode fiber-optic cabling to Tier 1 specifications. Fitting into the unit's adapter bay, the optional modules transform the LanTEK II into what the manufacturer describes as "a cost-effective alternative to traditional OTDRs for certifying or troubleshooting fiber backbones and fiber links. Field-change-



able SC, ST, and FC adapters eliminate the need for hybrid launch cables." Three modules are available: multimode LED for certification of conventional multimode fiber-optic cabling and 850 and 1300 nm (no mandrels required); multimode VCSEL/laser modules for certification of laser-optimized multimode fiber at 850 and 1300 nm; singlemode module with laser sources for certification at 1310 and 1550 nm. A single strand of fiber connected between handsets is tested at two wavelengths and in both directions simultaneously, while the length of the fiber is measured. This task previously required the technician to swap test instruments or connectors, Ideal explains.

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## Residential structured wiring system

Leviton has launched its "Connected Home" line of residential structured wiring products. Available on January 4, 2010, the full product line includes more than 1,000 products, with 136 new items, including the company's HOME 5e and HOME 6 residential-grade connect- ➤

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tors and patch cords. The company adds that a 128-page catalog is now being sent out to its Connected Home distribution network to support the new product launch. Applications assistance, configuration worksheets, and diagrams are included, along with product listings to help homebuilders and contractors select an ideal mix of equipment for their projects. In addition, qualified contractors now may be selected to become members of the new Leviton Residential Network Installer program. The program will allow member companies to promote themselves as being officially associated with the Leviton brand. Members also can offer their customers exclusive 25-year Leviton product warranties. Connected Home is part of the Leviton Network Solutions business unit. The full line of Connected Home products is offered through the company's extensive electrical distribution network.

**LEVITON**  
[www.leviton.com](http://www.leviton.com)

### Crossover fiber-distribution system

The FieldSmart Crossover Fiber Distribution System (FxDS) is billed by its manufacturer as a custom-configured system of fiber management components that may reduce the cost of fiber deployment, while maximiz- ➤

## New Products



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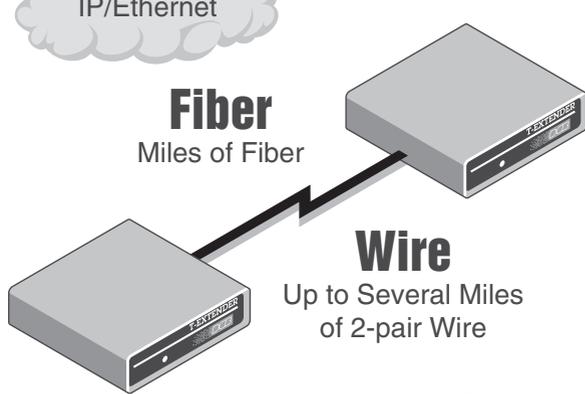


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# New Products

ing ease of use and system density. Based on Clearfield's Clearview Cassette, which provides integrated fiber management within a 12-port footprint, the company says the FieldSmart FxDS provides a modular and scalable solution, requiring only four SKUs to support hundreds of configurations. Supporting on- or off-frame splicing and scalable to 1,728 ports across a network, the FieldSmart FxDS can be deployed from the inside plant or outside plant of the network. The FxDS component can be configured for deployment as a standalone panel into an existing fiber frame, data cabinet or active outside plant cabinet. For inside plant density, the FxDS can also be deployed as a dedicated frame. The building block elements of the FxDS include the Clearview Cassette, a frame kit, crossover bulkhead, front fiber protection block, and rear fiber protection block.

**CLEARFIELD INC.**

[www.clearfieldconnection.com](http://www.clearfieldconnection.com)

## Energy-efficient cabinet system

Panduit recently introduced the Net-SERV Cabinet System, which it says enables improved thermal management and reduced power consumption in a design that optimizes flexibility and space utilization in the data center. According to the company, the Net-SERV Cabinets incorporate cable management design features that opti-

mize space utilization and thermal management for server applications. Cabinets are available in 600mm (24") and 700mm (28") widths, 1200mm (48") depth and in 42RU and 45RU heights. The cabinets are available configured from the factory with a variety of cable management options including high density, standard density, and vertical patch. Additional elements of the Net-SERV Cabinet System optimize cooling system effectiveness by maintaining hot/cold air separation and eliminating exhaust-area choke points. The Panduit Vertical Exhaust System (VES) channels hot air from the cabinet directly into the overhead return plenum, preventing hot air recirculation and allowing room and chilled water temperature set points to be raised. Air-sealing accessories prevent the mixing of hot and cold air by eliminating leakage through cabinet and floor openings, boosting cooling system efficiency. When deployed as an integrated solution, the Net-SERV Cabinet System enables data center managers to optimize airflow and reduce energy costs by 25% or more in a typical deployment, its manufacturer says.

**PANDUIT**

[www.panduit.com](http://www.panduit.com)

## 120-Gbit interconnect system

Molex has introduced the iPass+ High-Speed Channel (HSC) pluggable CXP

copper and optical interconnect system, designed to enable 12 channels of 10-Gbit/sec data for up to 120 Gbits/sec of total bandwidth. The iPass+ CXP provides both optical and copper direct-attach options for the same system port, thereby increasing the flexibility of system-level hardware for end users, the manufacturer says. This dual paddle-card system was adopted as the Infini-Band Architecture Specification Vol. 2 Release 1.2.1; Annex A6 in September 2009. The unitary press-fit connector and cage assembly provides one-step placement to the host board and is offered in both single and stacked dual-port configurations. The copper versions are the first to hit the market. The Molex CXP 12X direct attach copper cables are designed to accommodate single, ganged, or stacked connector configurations in extremely high-density requirements. The CXP passive copper cables are available in a variety of lengths. The active optical cable (AOC) versions of the CXP interconnect, with pluggable optical module cable assemblies and loopbacks, are still in development. Cabling options for CXP optical products will include 24-fiber round OFNP-rated jackets in 3.8- and 5.4-mm diameters, filling both shorter rack-to-rack and longer riser cabling requirements.

**MOLEX INC.**

[www.molex.com](http://www.molex.com)

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