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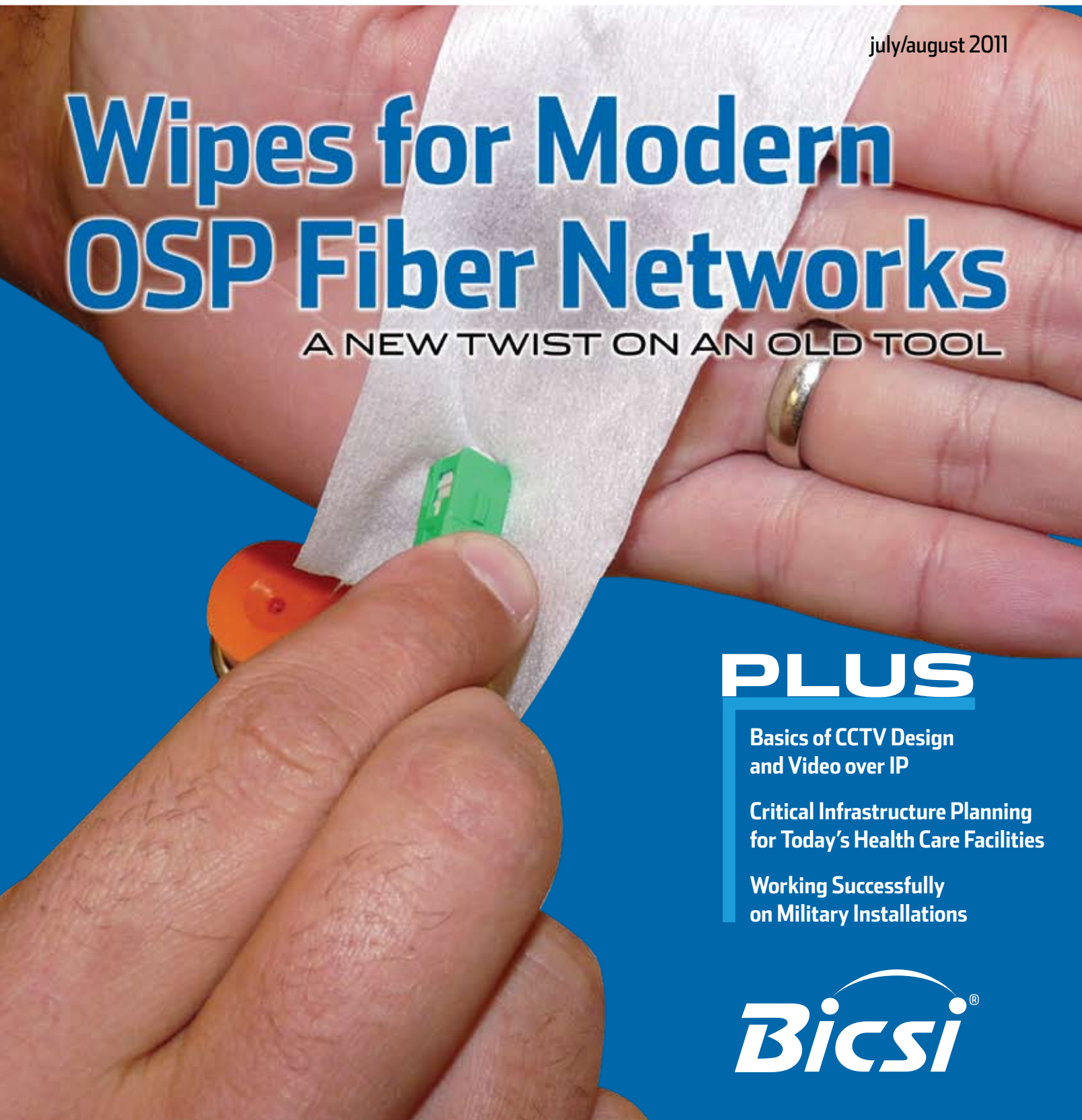
Wipes for Modern OSP Fiber Networks

A NEW TWIST ON AN OLD TOOL



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A 10 gigabit backbone channel provides the flexibility to manage available bandwidth while accommodating traffic spikes, limiting latency to an absolute minimum even during periods of increased usage and multiuser requests.

by John Awad, RCDD, NTS

The Case for 10 GIG

From low latency and cost reduction to flexibility and preparing for future technologies, the use of 10 gigabit cabling in backbone and horizontal network infrastructures is the key to success.

John Awad, RCDD, NTS, is a technical sales specialist with Optical Cable Corporation, a leading manufacturer of data communications cable and connectivity solutions. He can be reached at john.awad@occfiber.com.

Better for Wi-Fi

In September 2010, a United States university encountered a challenge when students returned to classes. During the summer, many students had acquired new smartphones with cellular data and wireless fidelity (Wi-Fi) capability, and many had purchased Wi-Fi-enabled laptops and tablets. The increase in Wi-Fi access by smartphones, tablets and laptops quickly used up available backbone bandwidth and created bottlenecks in sections of the campus network. This happened in the first week of the semester on a network that, three months earlier, did not experience any issues.

Unlike business and workplace applications where many mobile phone billing plans include unlimited data network use, the new phones included limited cellular data plans. Accordingly, the cost to use these devices for data over the cellular network was more expensive when compared to using the school's Wi-Fi network, for which there is no extra charge; therefore, students chose the free Wi-Fi as their primary wireless Internet access option. Smartphone or laptop wireless data users who experience any data latency in the cellular data network will often quickly switch to the local Wi-Fi-enabled LAN when possible. When this happens in a dense population of users, such as on a college campus or in a convention center meeting, available LAN backbone bandwidth can be quickly used up. However, when a 10 gigabit backbone, switches and routers are in place, more bandwidth can be available, with more room to allocate as needed.

There are other aspects of this increased campus Wi-Fi use that justify a need for 10 gigabit cabling. Wireless access points (WAPs) will typically allow a finite number of connections per access point. Devices, such as smartphones, laptops and tablets, will "ping" the nearest WAPs when looking for an available network and measuring signal strength. When the pinging occurs, it uses up a connection slot at the receiving WAP for a period of time or until the ping connection is released. This can be especially true in high-density or public areas such as campus quads, auditoriums and large lecture halls.

Larger capacity WAPs can be purchased to increase the amount of connection points that are available. Using 10 gigabit cabling for WAPs that are accommodating a higher number of connections will allow maximum potential usage and increase the number of ongoing available network connections. Also, with the increase in Wi-Fi traffic requiring higher bandwidth and quality of service with minimal latency for applications like video conferencing, the need for 10 gigabit cabling to high-capacity WAPs is justified at a reasonable cost per user.

Ideal for Virtual Servers

The ability to combine multiple servers virtually onto one piece of hardware is called server virtualization. This practice allows multiple applications and workloads to run on fewer machines using multicore processing. Server virtualization is driving a need for bottleneck-free cabling with faster speed capabilities and lower latency throughout the network. Upgrading the cabling to accommodate increased virtual servers' bandwidth needs can reduce the need for excess servers and other hardware, providing a worthwhile return on investment. Fewer cables, connections, ports and network interface cards (NICs) to manage can lower long-term maintenance and management costs, providing overall lower cost of ownership. Using a higher bandwidth 10 gigabit Physical layer to accommodate server virtualization also increases computing and network capabilities.

Server virtualization is just one practice that can help control overall costs and allow for cabling upgrades and bandwidth increases for future availability. A 2006 International Data Corporation (IDC) survey stated, "Based on a survey of more than 400 IT organizations currently deploying server virtualization, IDC found that customers are looking to not only increase the penetration of virtual servers within their environments, but also to increase the number of virtual machines per physical server."[1] Increasing the number of virtual machines per physical server enables greener data centers. Less power is required for the reduced numbers of physical servers and subsequent cooling requirements along with a smaller quantity of cables.

Effective for Flexibility

A 10 gigabit backbone channel provides the flexibility to manage available bandwidth while accommodating traffic spikes, limiting latency to an absolute minimum even during periods of increased usage and multiuser requests. The upsurge character of applications used in enterprise backbone environments are well served with 10 gigabit OM3 and OM4 multimode optical fiber cables. These cables have the bandwidth available to accommodate traffic increases and help eliminate slow network and file transfer problems caused by applications like video conferencing, online video, medical imaging and centralized storage. These applications will be accommodated with maximum efficiency using 10 gigabit technology in the backbone infrastructure.

The interoperability of 10 gigabit Ethernet also allows support to and integration with existing 10/100/1000 megabit systems. The ability to implement 10 gigabit Ethernet over extended distances up to 40 kilometers (km [25 miles (mi)]) can be useful in consolidating multiple LANS and equipment spread out over a campus or wide area network (WAN). This extended distance capability provides more flexibility when choosing data center and server locations.

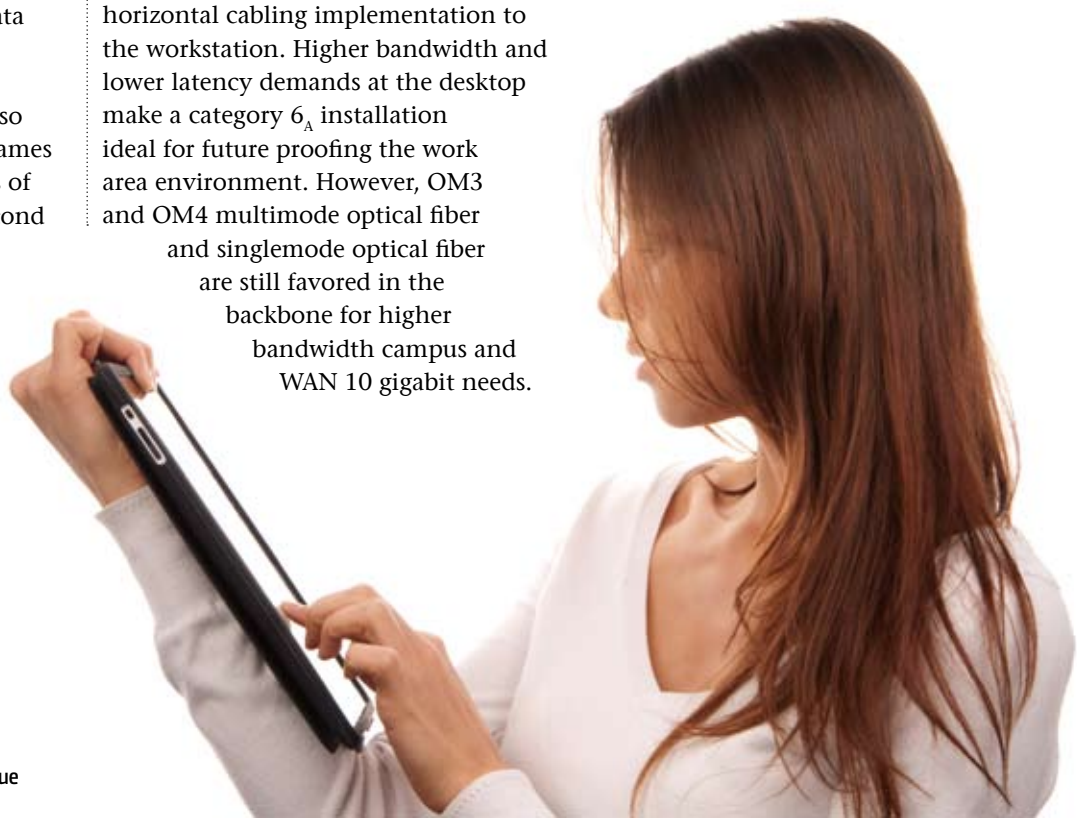
From a network maintenance perspective, 10 gigabit Ethernet also enables the transfer of Ethernet frames without modification over a series of 10, 100, and 1000 megabit per second (Mb/s) and 10 gigabit per second (Gb/s) links along an extended distance path and between organizational and service provider networks. Proven technology, based on the latest Ethernet standards, can allow fast changes to an expanding infrastructure without compromising security or any additional need for new network software or network management training.

Perfect for Future Proofing

In the horizontal cabling infrastructure, a 100 meter (m [328 feet (ft)]) or less total channel distance using 10 gigabit capable category 6_A unshielded twisted-pair copper cable and connectivity can be achieved at a cost of less than $500 per port. As the use of streaming video, power over Ethernet (PoE) and voice over Internet protocol (VoIP) requirements continue to increase, this can be ideal for client server and other shell implementations at the desktop that require lower latency. Applications, such as 3-D modeling, engineering capabilities and medical applications, can take advantage of new multicore processor technology in high performance servers, allowing high-bandwidth computing power to be accessed from the client work area.

Copper connectors are a familiar media interface for installers and end users, and when category 6_A copper connectors and cable are combined with appropriate installation practices, a high performance 10 gigabit channel up to 100 m (328 ft) can be achieved. Second and third generation active 10GBASE-T chips will consume less power and produce less heat. Combined with advanced 10GBASE-T NIC technology, this can be an ideal horizontal cabling implementation to the workstation. Higher bandwidth and lower latency demands at the desktop make a category 6_A installation ideal for future proofing the work area environment. However, OM3 and OM4 multimode optical fiber and singlemode optical fiber are still favored in the backbone for higher bandwidth campus and WAN 10 gigabit needs. OM3, OM4 and singlemode cabling installed today can use multifiber connections to accommodate array connectivity and next generation network speeds. Ongoing innovations of faster processors and computing power are driving an increasing need for more bandwidth. New and improved technologies, such as desktop video conferencing, 3-D modeling systems, telemedicine, video creation and editing, and other applications not yet invented, will advance rapidly over the next 10 years.

Today, 10 gigabit optical fiber cabling can effectively be used between switches and routers. The use of 10 gigabit copper in horizontal cabling to the work area will allow scalability and control costs. Gigabit Ethernet, which is acceptable for most applications, can currently be run, but a 10 gigabit infrastructure system will allow users to use the latest technologies both now and into the future. ■



REFERENCE

[1] "Enterprise Server Virtualization Market Booming, Reports IDC." www.cablinginstall.com. December 6, 2010.

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