Fiber Optics Enable Many New Possibilities for Campus Networks

Noovis
Infinite Possibilities

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Fiber Optics

Hundreds of college campuses, office parks, stadiums/arena's, hospitals and retirement communities across the country are investing millions of dollars to upgrade their broadband and wireless networks from copper to fiber.

Although fiber optic networking technology has been around for decades, facilities are beginning to leverage it, particularly in dense user environments, where legacy networks are proving inadequate for modern data, wireless access and other broadband demands. Optical networks support diverse traffic flows, including stream- and file-based production workflows, live broadcasts, content backup and recovery, cyber and cloud access requirements, immense network loads and enterprise traffic.

Over the next decade, a growing number of campuses will make the move to fiber-based, local-area networks, known as GPON – gigabit passive optical networks – to achieve a vastly superior user experience, higher capacity, lower capital and operating expenses and enhanced security.

The Chokepoint

Countries, regions and cities have been equipped with long-haul fiber capacity; now the bandwidth chokepoint is more local – in and between buildings. Fiber-based networks (optical LANs) are designed to remedy bandwidth bottlenecks.

New technology consolidates multiple, discrete, and often single-use legacy networks into a more secure *converged* fiber optic network that carries a myriad of data, cable TV, Internet, building automation, telephone, and even cellular phone (DAS) – through one pipe.

Sustainability

One of the most significant points of impact GPON has on an institution is energy savings. The potential to reduce power consumption using fiber is substantial. It takes up to 60 percent less electricity to distribute data, voice and video throughout a campus via fiber when compared to copper. In fact, copper wire can be expected to carry a signal approximately 300 feet before an electronic device is needed to boost the signal. Conversely, fiber can carry the same signal for up to 12 miles.

Typically, every floor of a large building has a telco closet with a rack of electronics that delivers service to each local work group. Each of those locations has a power supply and cooling requirement. Fiber eliminates these closets and related equipment.

In addition to conserving electricity, fiber, when compared to copper, results in a meaningful reduction in materials. A typical building with 4,000 Ethernet ports fitted out with fiber instead of copper saves 8,000 lbs. of plastic and copper. This is especially appealing to customers who are tasked with developing more sustainable operations and securing various green building certifications.

Energy Consumption

In a typical campus setting, fiber in place of copper can save up to approximately 75 percent of the electricity required to run a network. The total savings can be substantial for larger networks. A campus with 2,000 users can save up to 514,000 kilowatt-hours of electricity per year. This is enough energy to power 47 typical American homes.

Power Consumption Comparison

		Number of Users					
		250	500	1000	2000	3000	5000
Fiber Optics	Total Power	3350	5400	9650	19000	28350	46300
	Per User	13.4	10.8	9.65	9.5	9.45	9.26
Copper	Total Power	11026.09	20533.73	39626.29	77734.13	115841.97	191125.23
	Per User	44.1	41.07	39.63	38.87	38.61	38.23
Savings	Savings	7,676.09	15,133.73	29,976.29	58,734.13	87,491.97	144,825.23
	Per User	30.7	30.27	29.98	29.37	29.16	28.97
	% Savings	69.62%	73.70%	75.65%	75.56%	75.53%	75.78%

Energy consumption and savings expressed in watts. Sources: Verizon Business and U.S. Department of Energy

Lower Costs

Migrating to an optical network will likely result in both capital and operating savings.

Fortunately, the components required to distribute data across fiber networks have come down in price over the past few years, making new networks financially feasible. Fiber can provide superior services to campus occupants at below-market prices that allow organizations to recoup the initial outlay and put aside enough money for periodic refreshes of peripherals.

In addition, because legacy copper networks can span only a fraction of the distances that fiber can, longer runs mean fewer electronics and up to 80 percent fewer telco closets. Having fewer components lowers operating costs (including service and maintenance), and square footage previously dedicated to housing equipment can be reclaimed and repurposed.

Dramatically Improved Throughput

Not all Wi-Fi is created equal. State-of-the-art optical LANs allow all devices – printers, tablets, whatever – to connect up wirelessly from anywhere on a campus to an incredibly fast system with medical-grade, HIPAA- compliant security and carrier-grade reliability (network is available 99.999% of the time).

With fiber…comes bigger ideas. No longer will your local-area network be the obstacle to deploying smart building technologies. What if we could automate every door lock and thermostat on campus and control them in real time from a mobile device? What if we could significantly increase pedestrian security by installing cameras all over campus with enough coverage that the chances of a crime occurring out of view of one or more would be close to nil? What if we could stream uncompressed HD video on any device, wirelessly, anywhere on campus? What if we could provide scalable, dynamically flexible bandwidth to support fluctuations in workflows and the big, far-reaching initiatives that we have yet to dream of?

It's all possible. Higher network speeds with the proper fiber and wireless infrastructure increase production and accelerate workflows, keeping organizations flexible, competitive, innovative, safe and secure.

Secure by Design

Fiber optic cabling is inherently more secure than copper cabling because it is not susceptible to interference or cross-talk nor does it radiate emissions that can be eavesdropped without physical access. You cannot "listen to" fiber from any distance. However, it is possible to extract information from a fiber by inserting a tap.

Typically, cyber security plans have incorporated technologies such as encryption, firewalls, and intrusion prevention within the active portion of the network. What hasn't been integrated into these plans is a mechanism to protect the physical network infrastructure (OSI Layer 1). This overlooked area of vulnerability exposes the network to unpredictable and potentially detrimental events. The cost impact of an incident could prove to be high and possibly catastrophic.

In response to this, industry has developed solutions for building highly secure LANs by combining the inherent security benefits of Optical LANs with fiber optic monitoring systems that perform 24/7/365

continuous monitoring of critical network infrastructure. These systems detect and report any changes or behavior that would indicate tampering with the cable system as a precursor to an attack or damage that could degrade network performance or availability.

Fiber optic network-monitoring systems that are compliant with DoD standards for securing classified network infrastructures have been deployed throughout the U. S. Department of Defense. In response to an emerging need within private enterprise for network physical asset protection, similar monitoring systems are available as well.**

**Information furnished by Network Integrity Systems

C-Level Managers

Word is spreading fast. Each month, a new business cohort of health care and higher-education executives becomes convinced that optical networks are the way to go. As C-level leaders learn about the advantages of fiber, they typically do a cost-benefit analysis and start planning an overhaul of their legacy networks. The advantages include:

- Decreasing energy consumption by up to 60%
- Decreasing required space for equipment by up to 80%
- Significantly improving wireless coverage
- Ability to add data-intensive applications without worry
- Dramatically improving security
- Creating a more sound infrastructure platform on which to build the future

Case Study

Erickson Living, the nation's leading operator of retirement communities, is investing millions of dollars to install new fiber-optic technology – GPON. This optical LAN solution will satisfy customer demands and attract residents by providing improved internet, cable TV, telephone and cellular service. In addition, Erickson Living will leverage GPON for smart building initiatives (access controls, video surveillance, HVAC optimization, etc.)

The first phase of the project, which includes a community in Springfield, VA and three communities in Maryland, is scheduled to be completed in early 2015. Later phases over the next few years will include similar upgrades in other communities throughout the U.S.

Erickson Living, which has long been dedicated to providing a comprehensive set of services directly to its residents, sees GPON as means of extending its experience to them. Under Erickson's latest initiative, Erickson Connect, staff connects all of a new resident's devices to its converged network and furnishes a working phone number on day one as part of a move-in experience. There are strong early indications that its state-of-the-art, converged networks are differentiating Erickson Living in the eyes of consumers, giving Erickson a meaningful competitive advantage.

The Way Forward

Fiber based technology is about *massive scalability*. It's about significantly improving services today while ensuring that the architecture is in place to support ever-evolving technologies and market demands.

Fiber is a protocol-agnostic network backbone that has been deemed to be future-proof. It should meet broadband requirements for decades even as applications become more sophisticated and enterprise requirements expand. With fiber networks, CIOs and others are far less wary of the future.

Many experts foresee a day in the near future when hospitals, universities and other high-occupancy/high-demand buildings and campuses will centralize their architecture. For a growing number of decision makers, the choice is clear, fiber-based LAN is the best way forward.