

Empower students for next-generation connectivity and learning



How cost-efficient, optical fiber networks are transforming the educational experience for a new age

Highlights:

Colleges and universities are scrambling to address students' insatiable demand for connectivity while establishing more cost-efficient pathways for learning. Converged fiber networks are answering these needs, replacing massive copper-based LANs with a high-speed, energy-efficient alternative. Benefits include:

- Pervasive connectivity
 - One network for all communications
 - Future-proof platform
 - Greater security and reliability
 - 30–50 percent lower network costs¹
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Today's students have grown up in a connected world, embracing mobile, social and cloud technologies for digital learning and collaboration, increasingly viewing technology as vital to their academic success. They expect fast, reliable network access everywhere they go, on every device they use. But delivering on these expectations has grown more difficult for colleges and universities, especially as budgets have grown leaner. Providing students with the high-speed bandwidth and enhanced, personalized learning opportunities they demand requires the right network and, increasingly, analytic insights.

Schools that are succeeding are implementing a converged fiber network with passive optical network (PON) and distributed antenna system (DAS) technologies. They gain an ultrafast, future-proof platform for student learning and engagement while significantly reducing their expenses, power consumption and environmental impact.

The new learning agenda

Providing connectivity in the classroom is no longer enough. The bring-your-own-device (BYOD) movement is flourishing, and it is necessitating that mobile access be extended to all campus locales. Whether streaming video in the dorm, downloading homework assignments in class or posting game-day photos from the field, students expect to be online and connected. Moreover, they are setting a new agenda for how they will learn. They expect educational institutions to support their technology needs by providing fast, reliable connectivity. They also expect those institutions to enrich their academic experience in ways that reflect their evolving learning style and technology preferences. They want to be engaged more fully inside and outside the classroom, using device-optimized learning tools and applications that supplement classroom lectures, allow them to delve deeper into research and collaborate with peers and faculty.



Addressing the technology needs of this new kind of student is essential for colleges and universities that expect to keep their enrollments up. Learning has been transformed into an anytime, anywhere activity, and technology is increasingly a differentiator in school selection. These new parameters mandate a more capable network infrastructure, one that can meet surging expectations for bandwidth and digital learning without driving up costs and complexity.

A new kind of network for a new kind of student

Tackling the challenges of digital learning requires a network that is highly flexible, scalable and capable of providing affordable high-speed services to on-campus facilities, surrounding buildings and even remote locations—wherever students, faculty and administrators congregate. Traditional approaches have used multiple network infrastructures and relied on layered Ethernet switches and copper cabling. These infrastructures are massive and inherently limited, unable to deliver the bandwidth, range or reliability to meet current requirements. Moreover, they are costly to operate, necessitating considerable space, power and personnel to deploy and maintain.

Passive optical networks that use a converged fiber infrastructure with DAS overcome these limitations by replacing the labyrinth of copper cabling and switching equipment with space- and energy-saving optical fiber and by integrating multiple networks and services on a single network infrastructure. The result is a simplified network that can deliver scalable bandwidth at the speed and intensity today's university communities demand. Fiber optimizes network performance and agility while significantly reducing cost and complexity.

Converged fiber networks can be deployed and operated at one-third less than the cost of traditional networks.² This is achieved through service integration and a smaller

equipment footprint, which speed installation and reduce power, cooling and space requirements. Quality of service is centrally monitored through a single management console that provides consolidated access to virtually all network devices and ports while simplifying administration. This lowers the risk of downtime and enables the network to provide extremely reliable, secure connections, enhancing the productivity of students, faculty and administrators.

With its ability to integrate massive amounts of data from various sources, a converged fiber network also enables administrators to take advantage of analytics for improving campus security and operational efficiency. It facilitates the use of intelligent video surveillance to identify and investigate suspicious events and trends in real time. Campus operations personnel can use the resulting insights to enhance safety and security controls. They can also combine security insights with other operational data feeds (about weather, local events, for example) to make more informed decisions and mitigate student risk.

One network for all

Converged fiber networks allow the full range of IT, communications and building services to operate over the same shared fiber infrastructure. That means one network for everything from wired and wireless voice, video and data to security surveillance, HVAC and lighting. The cost benefits of this convergence cannot be overstated.

DAS enables wireless carriers to broadcast their signals over the same fiber infrastructure. It enables schools to provide pervasive, high-speed wireless coverage across campus but also to remote structures like athletic stadiums. As students move from one covered area to another, advanced features like capacity steering and location services enable an enhanced experience wherever they are. Before a big game, this might include directing students to the nearest available parking garage and concession stands.

Advancing the educational experience for students in White Plains³

Twenty-five miles north of New York City, White Plains School District was about to embark on a plan to provide students with laptops and tablets so they would have freedom to learn, study and collaborate anywhere on campus. But the district's information systems group knew that the current LAN infrastructure couldn't support the increased usage. Even with a costly upgrade, the copper network wouldn't be able to provide the requisite scalability, reliability and security for the new devices and applications.

The information systems group determined that a new fiber-based PON was the way to go. PON would provide needed flexibility and scalability while lowering the district's electrical, cooling and maintenance costs. Network management would be streamlined with less equipment to manage and the ability to manage it from a single console. PON would also improve availability. If one classroom or building went down, the network's decentralized architecture would allow it to keep running.

The cost savings and efficiencies from the new network have translated into additional investments in technology and learning innovation for students. Moreover, district leaders feel confident that the network has prepared them for whatever lies ahead.

Opportunities for learning innovation and student growth

Converged fiber networks with PON/DAS provide a platform for more personalized learning and student growth, enabling students to take advantage of new modes of learning. When students can access recorded lectures at their convenience, as many times as they need, time in the classroom can be for other things, like group exercises and question-and-answer sessions that supplement lecture content.

With the right network, there is a huge opportunity for educators to create more in-depth and engaging learning experiences for students, whether by incorporating real-time discussions with subject matter experts, crafting small group experiences online or making auxiliary content available for download. When students can select from a menu of complementary learning experiences tailored to their strengths and needs, they are more likely to master the material. This more personalized approach augments each student's learning, satisfaction and growth.

Also, since online learning facilitates the use of analytics, faculty can collect data on how and what students are learning. Those insights can lead to course designs customized to student needs and better use of classroom time and space, while enabling educators to pinpoint the most effective teaching methods in the digital age.

IBM builds next-generation networks

At IBM, we've made it our business to understand our clients' needs and objectives. We provide network solutions in the context of those requirements. We design, deploy and manage networks that drive growth and facilitate innovation.

Today our network solutions are transforming the learning experience for students and creating new opportunities for educators. IBM NextGen Campus Networks leverage PON and DAS technologies to meet increasing campus demand for fast, reliable bandwidth. By increasing student access to applications and resources, these converged fiber networks enable you to deliver an enhanced educational experience while dramatically lowering costs, energy consumption and management complexity. They can be easily configured for the user and bandwidth density of your campus, and they are modularly structured so you can deploy advanced features as needed.

Our ability to bring together all of the software, applications and technologies required for effective networking today—from LAN, wireless and WiFi to cloud, mobility, analytics and security—allows you to create a sustainable, cost-effective platform for advanced learning now and in the years to come.

For more information

To learn more about PON, DAS and IBM NextGen Campus Networks and assess the potential for your organization, contact your IBM representative or IBM Business Partner, or visit:

ibm.biz/PON_DAS_network



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^{1,2} In IBM client engagements, PON has been shown to reduce capital costs by 30–55 percent and ongoing operational costs by 30–70 percent. Individual results may vary.

³ IBM. “*Enhancing the educational experience in the White Plains School District.*” June 2015.



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