

The physical infrastructure technology of schools is becoming outdated at a time when federal, state, and local funding is limited to pay for necessary upgrades. Learn the six ways that school districts are extending the lives of their existing technology infrastructures and preparing for future capacity needs.

Six Strategies to Future-proof Your School Wiring Network

By Matt Bolch

Nowhere is the frenetic march of technology more evident than in today's classrooms. The widespread use of online learning, along with students and teachers bringing their own devices to school, is creating both technological and policy challenges for district administrators. School policies, at least, can be easily amended. The same cannot be said of the physical infrastructure technology: the cabling, switches, routers, receivers, and transmitters that help disseminate information throughout a school campus. Physical infrastructure technology requires time, careful planning, and – most importantly – money to upgrade.

The need is critical. National groups and classroom teachers are all seeing the increased usage of digital materials to propel learning. In fact, according to the U.S. Department of Education and studies by the National Training and Simulation Association, students can reach a learning objective up to 80 percent faster using technology-based instruction rather than traditional methods. A recent survey of nearly 2,500 Advanced Placement and National Writing Project teachers shows that 73 percent report that they or their students use mobile phones in the classroom or to complete assignments, while 45 percent report use of e-readers, and 43 percent report use of tablet computers for the same purposes.

Bandwidth Requirements Are Increasing

The move toward digital learning and

digital materials is creating a rapidly increasing demand for bandwidth that can overwhelm a school's physical network infrastructure and cause significant budget concerns.

An FCC (Federal Communications Commission) survey in 2010 showed that, although most schools had some form of broadband, nearly four in five schools said those connections were inadequate to meet current needs. The intervening years have brought little relief, partly because of funding issues and partly because of the continued expansion of bandwidth-hungry digital learning and the proliferation of mobile devices on school campuses.

A SETDA (State Educational Technology Directors Association) report released in 2012, "The Broadband Imperative: Recommendations to Address K-12 Education Infrastructure Needs," recommends that schools upgrade their external Internet connections to 100 Mbps per 1,000 students and staff by 2014-15 and to 1 Gbps per 1,000 students and staff by 2017-18. In addition, the document calls for wide-area network (WAN) connections from the district office to each school and among schools of at least 1 Gbps per 1,000 students and staff by 2014-15 and at least 10 Gbps by 2017-18.

With districts already struggling to keep up, and with federal and local funding tight, achieving these enhancements will present a monumental challenge. Districts will have

About the Author

Matt Bolch, principal at Landscape Creative, has been a journalist for more than two decades. Following a long career as a reporter and editor for daily newspapers, he has been writing about K-12 and higher education topics for industry trade publications for ten years.

Digital Textbook Savings:

Discovery Education, the top brand of digital textbooks, costs between \$38 and \$55 per student for a six-year subscription. The average traditional textbook is \$70 per student, so there's money to be saved by beefing up school technology infrastructure.

Source:

The Rise of Tablets as Textbooks, Huffington Post, March 16, 2013

to work harder and smarter to achieve these goals in a cost-effective manner.

In addition to bandwidth issues, school districts face challenges stemming from outdated or insufficient wiring infrastructure. Cabling may be inadequate to handle increased data capacity or may have been compromised in some way since its installation. The same is true of couplings, connectors, and wiring cabinets. In addition, physical network infrastructure is increasingly being used to support IP communications systems, security and surveillance systems, HVAC controls, sensors, and more.

K-12 IT Administrators Caught in the Flood of Information

As a result of the flood of higher bandwidth applications and new technology aimed at building access and school security, district IT managers face a number of challenges to optimizing their IT and wiring infrastructures. Let's face it, physical network infrastructure is not exciting, but it's an absolutely critical component of any technology installation.

IT managers face the task of designing physical infrastructure on a tight budget, not only for today's students but for future generations as well. This task can be more complex than most enterprise applications because of the speed at which technology can change in the education realm. Not only must the system support the everyday administrative, security, and monitoring functions of a large and often widespread campus, it also must provide on-demand curriculum material to a wide variety of audiences.

Because of budget concerns, IT spending increasingly faces tighter scrutiny that may limit the available solutions and potentially affect the flexibility, quality, and reliability of the network. Cost savings associated with installation, management, and maintenance are important, but how can they be accomplished without compromising reliability, flexibility, safety, and security?

District Technology Leaders Get Creative

Bullitt County Public Schools has been down numerous wiring paths in just the last decade. The 13,000-student district just south of Louisville, KY, started using token-ring local area network technology with 16 Mbps connections in the mid-1990s, then upgraded to 100 Mbps Ethernet connections in 2002 when the token-ring network could no longer handle the capacity, recalls Jim Jackson, district technology coordinator.

In 2005, the district started laying its own fiber-optic cable, which now measures 80 miles and connects all but two of the district's 25 school buildings. "We have 12 strands going to each location," Jackson says. "It leaves us room for growth because it's handy to split off."

The fiber-optic cabling allows an infrastructure backbone of 1 Gbps to be available at each location, which should provide sufficient bandwidth for years to come. "Should we decide to upgrade, we can do it with the fiber we have," Jackson says. "All we have to do is change the equipment in the [IT] closet for higher bandwidth."

Still, having sufficient bandwidth within school walls, from either copper cable or fiber-optic lines, will not be enough without adequate distribution infrastructure within and outside of the building. As the district has built new facilities or renovated existing ones, it has relied on support from Panduit, a global provider of physical infrastructure technology and solutions. Leveraging Panduit's expertise, Bullitt has relied on wiring diagrams to use as templates and to bid the cabling installation as a separate item in the project budget.

“If a general contractor or an electrician gets the bid, the standards aren’t really followed,” Jackson says. “I can’t stress

enough the importance of getting the sweeps of the bends right to protect the integrity of the system and get the best performance possible.”

Since cabling is often installed in concrete slabs and left open to the elements – possibly for months – Bullitt County Public Schools has moved from using standard cable in those areas to using an indoor/outdoor cable with a protective gel coating that resists water (wet cables can cause slow connection speeds or rust). Jackson notes that painting cable may void any installer warranties, an issue that cost the district \$70,000 to fix in just one facility, so IT staff

must work in conjunction with construction and maintenance staff to ensure that the integrity of the cabling infrastructure is not compromised.

Six Strategies to Future-proof Your School Wiring Network

With many districts facing these same future-proofing issues, here are six strategies for school IT administrators to consider before embarking on any physical infrastructure technology improvement plan.

1. Leverage the infrastructure that you already have. “You don’t have to reinvent the wheel every time,” advises Jonathan Cowen, North American channel manager for Panduit. “The first step in any project is to take an honest, unbiased look at what physical infrastructure you have, what you need, what’s outdated, and what the final project will look like. That should give you a starting point for the project.”

2. Listen to your end users. When schools were initially wired, their IT staffs reigned supreme. Now, however, users

(administrators, teachers, and students) have an increased say in what technology infrastructure will ultimately be deployed. “We try to be aware of what our end users want,” Jackson says. “We had a PC platform that worked fine, but when iPads came out, we had to change the network configuration. It has moved from an enterprise system to one driven by consumer devices.”

3. Upgrade as necessary. Increasingly, a school building’s IT infrastructure is also used to support IP security and surveillance devices, as well as IP speakers for informational and emergency broadcasting purposes. Likewise, distributed antennae systems (DAS) are being used to support cellular connections for 911 and other cellular applications. The same infrastructure can also support access control and remote HVAC monitoring and control. “If we see products we feel will benefit us, we’ll switch over,” Jackson says.

District IT managers should determine whether these ancillary, yet critical, uses will have a negative impact on the bandwidth needed for more general uses. “You need to consider both present usage and future usage, because bottlenecks will form at the weakest point,” Cowen says. “You could have the latest and greatest switching equipment and the best wireless technology, but outdated cabling could create that bottleneck.”

4. Use technologies that are flexible. Flexibility starts with the right design, Cowen notes. Projector cabling, for example, should be category-based to ensure it can handle future bandwidth needs. Cat 6A cabling is recommended in new installations and upgrades to handle present and future bandwidth needs for 7 to 10 years. In Bullitt County Public Schools, however, Jackson says he is using Cat 6 cabling in new projects because Cat 6A is cost-prohibitive for the district.

5. Wireless may be the way to go. “Wireless access and mobile devices are growing,” says Jackson, “but you still have to have the right technology backbone.” In recent construction projects, Jackson says

Teachers and the Internet:

A Pew Research Center survey of nearly 2,500 Advanced Placement and National Writing Project teachers in middle and high schools shows that:

- **92%** of these teachers say the Internet has had a “major impact” on their ability to access content, resources, and materials for their teaching;
- **69%** say the Internet has had a “major impact” on their ability to share ideas with other teachers;
- **67%** say the Internet has had a “major impact” on their ability to interact with parents; and
- **57%** say it has had a “major impact” on their ability to interact with students.

the district has struggled with how much hard wiring to install. “We’re constructing a new building, and we’re waiting to run wire until we better understand how technology will be used within the building,” Jackson says. The district recently moved from placing one wireless access point for every four classrooms to one access point for each classroom.

Cowen echoes the importance of wireless technology on school campuses and the need for infrastructure stability to support it. “The backbone infrastructure is more critical than ever,” Cowen says.

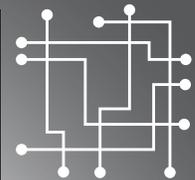
“Without a stable backbone, if everyone is bottlenecked in one area, it all goes down.”

Deploying wireless access points in all areas of the campus and administration buildings provides superior internal and external network access. Wireless access points should be secured against theft and damage, but Cowen cautions that certain security devices can restrict coverage. Coverage maps for wireless deployments inside and outside school buildings are crucial to prevent the occurrence of dead spots.

Six Tips to Smooth Your Next Physical Infrastructure Technology Project

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Leverage the infrastructure you already have.



Listen to your end-users.

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Upgrade as necessary.



Use technologies that are flexible.

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The backbone needs to support wireless.



Whatever bandwidth and infrastructure you have, consider more.

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6. Whatever bandwidth and infrastructure you have, consider more. The issue of ever-increasing bandwidth will not be going away anytime soon. District IT managers need to think ahead when upgrading infrastructure or planning renovations or new construction. OM4 internal fiber runs support 10 Gbps applications between interconnects, which is ideal. “I also recommend four hardwire cables per classroom, for the teacher’s computer, projector, audio capability and a redundant backup,” Cowen says.

Planning for What Comes Next and How Panduit Can Help

It’s not enough for district IT managers to consider the technology needs of today. Any installation must anticipate potential future technologies and the likely impacts on infrastructure – and few IT managers have crystal balls at the ready. That’s why it’s critical to have a technology partner to help districts plan ahead.

As a leader in physical infrastructure technology and solutions, Panduit understands both the unique needs and challenges of the education market and is more than a physical network infrastructure. Since every deployment is different, customer collaboration is just as important as any technology to ensure the success of any project.

Panduit combines the latest research and development technologies with application expertise and strategic alliances to help school district IT staffs manage risk within the physical infrastructure for both copper and fiber connectivity solutions.

Wireless needs are one of the biggest planning wildcards. “We’re dealing with an influx of mobile devices and trying to determine whether or how we can afford to provide devices for each student, or if, in some cases, they can bring their own,” Jackson says.

As curriculum and student needs change, the layout or function of a classroom often needs to change as well. A converged and wireless network environment allows teachers and IT staff to accommodate these changing needs to provide short-term and long-term cost savings. The life span of the network can also be

extended, since network upgrades or re-configurations can be performed with limited duplication and minimal investment.

The physical security of the network is another critical consideration. Panduit offers keyed copper and fiber connectivity solutions to mitigate unauthorized access to the campus network. Protecting network access points with tamper-resistant features reduces downtime and repair costs, producing a faster return on investment. Grounding systems can protect students and staff as well as electrical equipment.

Cowen advises districts to future-proof whenever possible to maximize the use of today’s cutting-edge technology to adapt to future needs. “Today it’s wireless, but tomorrow it may be something else that may need fewer or more connection points,” Cowen says.

About Panduit

Panduit is a world-class developer and provider of leading-edge solutions that connect, manage and automate the physical infrastructure. Panduit Unified Physical InfrastructureSM (UPI)-based solutions help customers integrate core business systems for a smarter, unified business foundation. Our robust partner ecosystem, global staff, and unmatched service and support make Panduit a valuable and trusted partner. For more information, please visit www.panduit.com/education.

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