



Infrastructure for Education Technology

PANDUIT[®]

infrastructure for a connected world



Ped·a·go·gy – the method and practice of teaching

Technology is causing a fundamental shift in 21st century pedagogy. As a result, the physical learning environment is transitioning from a passive learning space to an active learning space, where technology and instructors work hand-in-hand to provide a fully interactive learning experience. This poses a challenge for those responsible for the design and installation of network infrastructure in a school or across a campus.



Classrooms of today and tomorrow

Classrooms of today and tomorrow need to be designed with the tech-savvy student and instructor in mind. This new learning environment likely includes one or several of the following:

- 1:1 devices
- 3D printing
- Augmented reality
- Video game-based learning
- Online, in-class collaboration
- Multiple wireless devices per person

∴ Students remember **90%** of what they learn by doing or through simulation, compared to just **10%** of what they read and **20%** of what they hear.

— TalentLMS

These new technologies place demands on the network infrastructure that have never existed before. And, it requires extensive collaboration between IT and academic teams to ensure the correct infrastructure is in place to support the learning goals of the institution. A robust network infrastructure from Panduit facilitates the seamless integration of data (wired and wireless) communications and audio/video technologies that result in the classroom of the future, preparing this generation of students to be the next generation workforce.



∴ Major universities find that students in on-campus housing expect wireless connectivity for as many as eight devices per student.





The Converged Campus

Looking beyond classroom technology, the Internet of Things has made its mark on the educational institution, delivering improved operational efficiencies, a safe campus, and a seamless wireless experience from classroom to cafeteria to quad. School facilities and IT groups must work together to develop a network infrastructure plan that accounts for traditional data communications and VoIP needs, as well as systems like building automation, security and access control, POS, mass communication, and more.

With more of these systems coming onto the IP network, schools are challenged to make room for the additional, and often times larger, cabling in their already cramped telecommunications rooms (TRs). Panduit® Solutions for saving critical space help reduce your equipment footprint, lower material costs, reduce installation and maintenance time, and prepare for future additions to the TR.

⚡ "In the districts we serve, no one is planning for less wireless access. It's all about more."

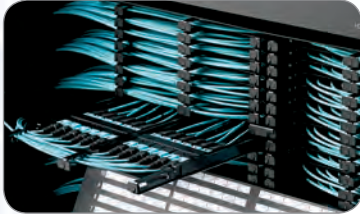
— Solutions Architect,
Panduit Gold Partner



Robust, Reliable Products for Education Environments



Copper Cabling Systems – Panduit® Copper Systems provide the infrastructure needed to connect networking applications in any school setting. From the largest campus to a single building, there is a Panduit solution that delivers the bandwidth and reliability needed. Our industry-leading Category 6A MaTriX™ Cabling System delivers 10G and takes the guesswork out of applications like Power over Ethernet and HDBaseT*.



Innovative Fiber Optic Systems – Panduit leads the industry with innovative fiber-optic solutions that meet today's network requirements and provide a migration path for tomorrow's applications. Panduit's PanMPO™ Fiber Connectors and the HD Flex™ Fiber Cabling System simplify the migration to 40G and beyond.



Racks, Cabinets, and Cable Management – Rugged, reliable infrastructure in the data center and equipment rooms houses and supports the technology that makes the campus hum. Look for innovative features from Panduit, like vertical cable managers that can hold patch panels for ultra-high-density deployments, and components that help manage power and cooling challenges in the data center.



Surface Raceway – When routing cabling behind the wall isn't a possibility, Pan-Way® Surface Raceway provides a safe, convenient, and attractive solution to route, protect, and terminate high-performance cabling systems. A variety of profiles, colors, and fittings equal a perfect fit for any classroom.



Network Security – Block unauthorized access to network infrastructure with a full line of blockout and lock-in devices. Compatible with copper and fiber connectivity, as well as USB ports, the devices help protect the network.

TIA-4966 Standard for Educational Facilities Summary

The unique nature of telecommunications infrastructure in educational facilities led TIA (Telecommunications Industry Association), to develop TIA-4966, a telecommunications infrastructure standard, as a resource specifically for educational facilities. Use TIA-4966 to plan and install structured cabling systems including cabling and pathways, and spaces for telecommunications infrastructure to support the large number of services and systems housed on educational campuses.

Highlights:

- Category 6A twisted-pair cabling and OM4 multimode, or single-mode optical fiber cabling is recommended for backbone cabling
- Category 6A twisted-pair cabling and multimode, or single-mode optical fiber is recommended for use in the horizontal cabling system
- Account for all equipment outlets when determining the size of the equipment room; this will likely result in a larger equipment room than standard commercial buildings, but may be necessary to support the additional requirements of building automation, wireless, security, and other intelligent systems
- Consider video surveillance and access control early in the design of a facility
 - Recognized media for surveillance cameras includes balanced twisted-pair cabling series 6 broadband coaxial cabling, and optical fiber cabling; Category 6 or higher is recommended to provide improved distance and remote powering capabilities
 - Cables supporting interior locations may be bundled with other low voltage cables
 - Conduit for outdoor cameras is limited to a maximum of 30 meters without a junction box, and the junction box must increase one trade size for each 30-meter run
 - Allow additional space in the TR to accommodate digital video recorders, network video recorders, and centralized processing and control units for access control; account for the power used and heat generated by these devices when calculating HVAC and power requirements
- All areas of an educational building should have wireless coverage; outdoor coverage should be provided when practical
 - WAP density should increase as expected occupancy and room size increases
 - In residence halls, place 1 WAP per 150m²
 - In place of assembly, such as large classrooms and cafeterias, use the following guidance:

Expected Occupany	Number of WAPs
Up to 125	1 WAP per 25 people
201 – 300	14
301 – 400	18
401 – 500	21

- In other buildings, place 1 WAP per 230m²

DISCLAIMER: Consult TIA-4966 in its entirety before designing and installing a structured cabling system in an educational facility. Panduit makes no representations and assumes no responsibility for the accuracy or completeness of the standard's summary set forth herein. Panduit disclaims any liability arising from any information contained herein or for the absence of same.



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