CASE STUDY

A 50-Year Network: West Virginia School Builds Back Smarter with Future-Proof IT Infrastructure

Did you ever think it would be possible to build a 50-year IT network that prepares K-12 students for a digital future without breaking the bank?

That's precisely what Nicholas County Schools in West Virginia did at their new Richwood Academic Complex when one dedicated technology director discovered a way to build back smarter using a revolutionary architecture that not only supports today's technology but is ready for tomorrow's—all while saving millions in construction, energy, and operational costs.

Rethinking Network Design

After historic floods devastated Richwood High School and Richwood Middle School, Nicholas County Schools expanded and upgraded an existing 40,000-square-foot elementary school to create a combined 110,000-square-foot K-12 academic complex. The construction of the new Richwood Academic Complex provided a unique opportunity to build a new IT network from the ground up. Chris Hanshaw, Nicholas County Board of Education's technology director and facilities manager, seized this chance to design an IT infrastructure that would serve the school for the next 50 years.

"I knew there had to be a better way to deploy the network that would prevent us from having to constantly upgrade equipment to meet the growing demands for high-speed connectivity and power," says Hanshaw. "When I came across Sinclair™ Digital's AGILE-CORE™ Distributed Edge Architecture, I saw an opportunity to deliver the technology that students need to succeed in the digital world while increasing power, saving space, and lowering costs."

AGILE-CORE™ Distributed Edge Architecture is a modular, plug-and-play solution that distributes fiber optic connectivity and safe, low-voltage power, providing a highly scalable, future-proof IT network infrastructure that offers an efficient and cost-effective alternative to conventional network design. In a conventional network design, intermediate distribution frame (IDF) closets equipped with switches, AC power, and cooling provide data and Power over Ethernet (PoE) via traditional copper twisted-pair cabling to endpoint devices. The 100-meter limitation of these traditional copper cables requires an IDF every 10,000 square feet, resulting in large cable bundles that run through ceiling pathways to connect devices in classrooms and other educational spaces. These long cable runs are difficult to deploy, and moves, adds, and changes are highly disruptive, often requiring technology upgrades to wait until school is not in session.

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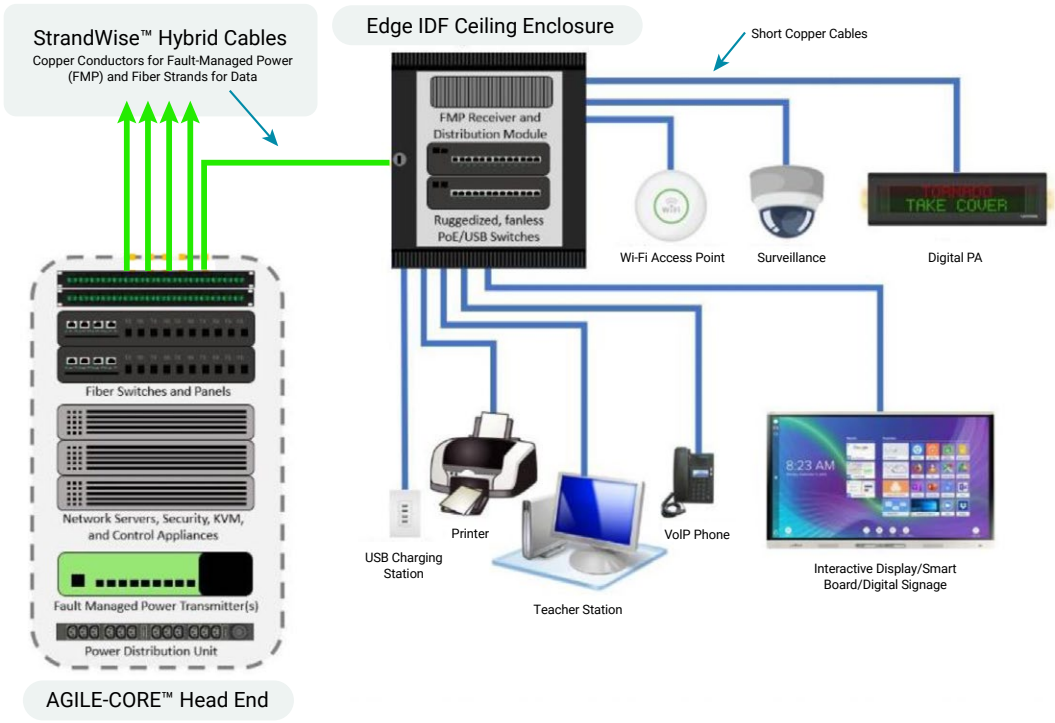
In contrast, the AGILE-CORE™ system employs a hub-and-spoke design with StrandWise™ hybrid cables that distribute power and data from a centralized HEADEND to Edge IDFs. The AGILE-CORE HEADEND houses switches and servers for network support, centralized management and control, and other network functionality. Each Edge IDF comprises
a prefabricated ceiling-mounted enclosure that includes all the necessary equipment to deliver high-bandwidth data and low-voltage PoE or USB power to nearby spaces.

Endpoint devices can be easily connected to the Edge IDFs via short copper cables to meet a variety of technology needs, including Wi-Fi, audiovisual (AV) systems, video surveillance, USB-C charging, public address (PA) systems, IoT sensors, and more.

Harnessing Cleaner, Safer Power

One of the most innovative features of AGILE-CORE™ Distributed Edge Architecture is the use of intelligent fault-managed power (FMP). Adopted as Class 4 power in the 2023 National Electrical Code (NEC), FMP efficiently delivers safe DC power over greater distances using transmitters and remote receivers to intelligently detect faults, providing superior protection from electric shock and fire initiation. At the HEADEND, the AGILE-CORE™ system converts AC grid power to this innovative, safe DC power. The power then converges with data over the StrandWise™ hybrid cable, which combines multiple pairs of copper conductors for power and fiber strands for data in a single, plenum-rated sheath. This streamlined solution saves pathway space and distributes data and power in a single cable pull to Edge IDFs up to 2000 feet away. The AGILE-CORE™ system can also accept direct DC power from renewable energy sources before converting it to FMP, providing Nicholas County Schools with the opportunity to leverage solar power in the future for increased energy savings and sustainability.



By distributing low-voltage DC power throughout a school, the AGILE-CORE™ system eliminates the bulk of AC-to-DC conversion required to power electronics. AC-to-DC conversion can result in significant power losses of up to 30% and introduce distortions into power distribution systems.

"Power has been one of our biggest challenges, and we've had to replace more equipment due to power demand rather than the need for speed. Plus, AC-to-DC power conversion creates dirty power that can cause network equipment to fail," explains Hanshaw. "With AGILE-CORE's fault-managed power, everybody is safer, there is no risk of fire, and we have clean, reliable, and efficient DC power that doesn't degrade our equipment, significantly reducing the frequency of equipment upgrades."

Maximizing the Life of the Network

To validate the benefits of AGILE-CORE™ Distributed Edge Architecture, Hanshaw and Sinclair™ Digital set up a demo classroom installation with a single Edge IDF and short copper cables for device connections.

"Having never used this technology before, we were able to deploy all the connections for a classroom in just four hours. This demonstrated the ease of installation and proved the system's capability, ultimately validating that AGILE-CORE™ was the best choice for our new academic complex," says Hanshaw. "As experts in distributed edge architecture, Sinclair™ Digital was the easy button in getting this project off the ground."

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Hanshaw proceeded with the design and installation of AGILE-CORE™ Distributed Edge Architecture for the entire new Richwood Academic Complex, which

included a total of 39 Edge IDFs to deliver technology to classrooms, laboratories, auditoriums, gymnasiums, administration offices, and other spaces.

Within each Edge IDF, FMP receivers and power distribution modules provide clean, safe DC power to fanless, ruggedized switches that offer silent operation and have an average lifespan of 20 years, compared to AC-powered switches with an average lifespan of just 5 years.

In the academic areas of the new complex, each Edge IDF supports the technology requirements for two classrooms, delivering Gigabit data transmission and PoE to a variety of devices via short lengths of copper cables, including:

+ **High-throughput Wi-Fi 5 access points for student connectivity**
+ **86-inch interactive classroom displays**
+ **Advanced digital PA system with LED display and paging/intercom**
+ **VoIP phones and panic buttons**
+ **Peripherals like printers and clocks**

Hanshaw worked closely with Sinclair™ Digital to design a future-proof infrastructure that would maximize the life of the network, connecting each Edge IDF with StrandWise™ hybrid cable that includes six strands of singlemode fiber and six 18AWG copper conductors to support current technology needs while providing enough dark fiber and dormant copper for the future.

"With each singlemode fiber pair capable of supporting 100 Gigabits and each copper pair delivering 600 Watts, our Edge IDFs provide a total potential of 300 Gigabits of bandwidth and 1800 Watts of power—enough for the infrastructure to last at least 50 years. The switches also have unused ports and available PoE capacity, providing immediate means for us to connect new devices."

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Saving Big on Installation and Operations

In an environment where budgets are tight and every funding dollar counts, most school districts struggle to keep pace with technology. However, for Nicholas County Schools, the AGILE-CORE™ Distributed Edge Architecture provides the new Richwood Academic Complex with a 50-year infrastructure without incurring significant costs. In fact, Hanshaw estimates that it delivered more than $1 million in savings compared to a conventional switched network design.

"By eliminating the need for IDF closets and long runs of cable bundles, AGILE-CORE™ Distributed Edge Architecture allowed us to reclaim enough square footage to accommodate three additional offices and two multi-purpose closets," says Hanshaw.

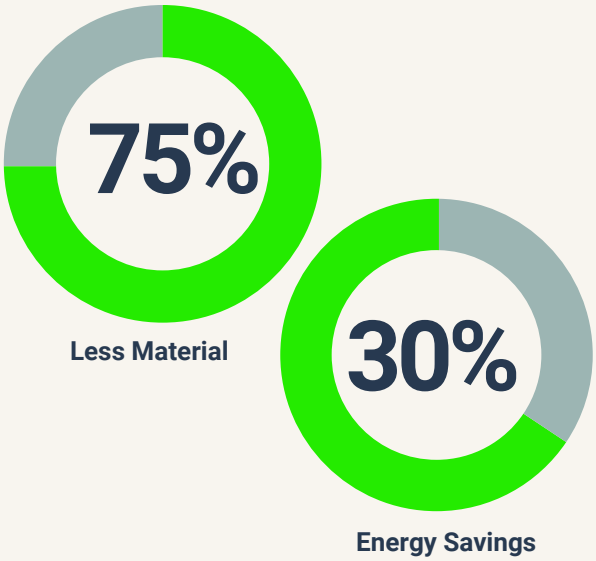
Eliminating the IDF closets and associated equipment, power, and cooling also delivers an approximate 30% in energy savings.

Because the AGILE-CORE™ system distributes low-voltage DC power via the StrandWise™ cable, the infrastructure can be deployed using typical IT installation practices. This eliminated the need for costly certified electricians, conduit, and circuit breakers required for traditional AC power, delivering significant labor and material savings.

Hanshaw points out that the AGILE-CORE™ system also delivers operational savings for years to come. "If we had used a traditional network design, we would have had 200 or more cables running down each hallway to provide connectivity to the classrooms. Now I have just five StrandWise™ hybrid cables that we won't need to touch for at least 50 years," he says. "My install costs are much lower, and moves, adds, and changes are fast and easy, requiring just a short patch cable from the Edge IDFs to power and connect a new device. That's something we can do ourselves without needing to bring in outside electricians or technicians, which significantly reduces our long-term IT maintenance costs."

Over $1M Savings

	AGILE-CORE™ Distributed Edge Architecture	Conventional Infrastructure Architecture
Cable Distance for New Devices	30	200
Largest Cable Bundle	2	70
Number of IDF Closets	0	6
Square Footage for IT Space	0	2050 sq ft
IT Cooling Requirements	0	50,331 BTU/hr



Giving Students a Competitive Advantage

Nearly a decade after the destructive flood, students walked through the doors of the new Richwood Academic Complex for the start of the 2025 school year. A significant milestone for Nicholas Country Schools and the Richwood community, the new school's AGILE-CORE™ Distributed Edge Architecture ensures access to the technologies that are transforming K-12 education—from interactive, gamified platforms that captivate students to adaptive learning tools that personalize content and emerging AI.

While AGILE-CORE™ qualified for E-RATE funds and saved considerable construction, energy, and operational costs, Hanshaw believes this new approach to IT network design is also vital to making those dollars go further and providing the technology K-12 students need to develop crucial future-ready skills.

"I look at the AGILE-CORE™ Distributed Edge Architecture as an insurance plan. The network will essentially pay for a refresh of student devices and give our educators and administrators more money to roll into innovative classroom technologies and school safety," says Hanshaw. "AI is already here, and robotics is on the way. We need to keep up with the changes. If we don't, our students will be at a disadvantage and fall behind the rest of the world. Thankfully, with AGILE-CORE™, we're more than ready for it."

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