

Next Generation Infrastructure

The education field is not typically known for its ability to adapt and evolve on the fly. That is, until the pandemic struck and educators were left scrambling to devise ways of continuing learning despite historic disruptions.

Now that most schools are either planning to resume schooling in classrooms or adopting hybrid schedules, school IT are examining their infrastructures and seeing clearly the weaknesses and needs as they move forward to an uncertain educational landscape. School infrastructures are dealing with an unprecedented amount—and variety—of data and applications, coming from both inside and outside the school domain. And education will look different when students and staff come back full-time at full capacity.

Luckily, funds granted from the American Rescue Plan Act (ARP) and the Elementary and Secondary School Emergency Relief Fund (ESSER) are allowing school IT departments to modernize their infrastructures to accommodate advanced technologies such as cloud computing, big data analytics, and digital transformation to help build a flexible and scalable foundation for the future.

Administrators looking for next generation infrastructure solutions want simplicity and cost efficiency, performance and resilience, and flexibility and scalability.

New Needs. New Challenges

A next generation infrastructure solution must adapt to changing educational needs, environments, and data requirements while resulting in minimal downtime, disruption, or gaps in performance that could negatively impact teaching and learning.

Many school IT administrators are searching for a single infrastructure solution that can deliver the simplicity and cost efficiencies of hyperconverged infrastructure, the performance and resilience of converged infrastructure, and the flexibility and scalability of reference architectures.

The goals of a next generation infrastructure are to increase resiliency to ensure availability and uptime; enable the network to automatically protect against evolving security threats; easily scale as future requirements change; and, support an increasing array of traffic types.

The wide range of possible learning resources requires differing levels of capabilities in the devices that students use for developing new skills. As skill building advances, so does the need for more computing power supported by reliable and consistent networks.

For example, digital content in later grades – such as simulation and modeling labs – will need more powerful computers and connectivity to run the complex math and rich visualization.

Workloads to run complex math equations and rich visualizations that rely on collaborative involvement and communication with team members can also benefit from more powerful devices. In general, richer learning methods and tools typically require more from the device.

All this will be necessary as compute uses intensify with IoT on campus, VR and AR tools, and a proliferation of one-to-one devices.

Why Wi-Fi 6?

One technology that many K–12 leaders are investigating is Wi-Fi 6, the emerging wireless standard. Formally known as 802.11ax, Wi-Fi 6 promises a fourfold increase in throughput which could help support an increasing number of wireless devices and applications; providing seamless connectivity to deliver 21st century learning. Wi-Fi 6 adoption is accelerating as administrators brace for the impact of in-person and hybrid learning.

While it doesn't happen often, occasionally a major technological advance comes along at just the right time. For instance, when devices compatible with Wi-Fi 6 came along, the latest upgrade in wireless networking arrived just as the pandemic forced a massive shift to online learning.

Yet Wi-Fi 6 is more than a slight upgrade. The newest wireless standard offers faster data transfers, higher capacity, and greater power efficiency that could extend battery life by 30 to 50 percent. Students, teachers, administrators, and staff will experience better performance on any Wi-Fi 6-enabled device, but optimal performance occurs when connecting over Wi-Fi 6-enabled routers and access points.

Whether teachers, students, and staff are at home, at school, or in a hybrid scenario, they are likely to be in device-heavy environments. To ensure their users can reap the benefits of high-performing wireless connectivity, organizations are expanding their fleets of Wi-Fi 6-enabled devices, routers, and access points (APs).

For IT teams, the higher capacity in Wi-Fi 6 APs means that each can handle up to four times the number of devices without degraded performance. Faster speeds and higher capacity matter to home users too, especially now that homes have become de facto classrooms. With up to 40% more data throughput with Wi-Fi 6, this is a big difference. And it remains 100% backwards compatible to prior generations of Wi-Fi so there is no issue utilizing or connecting existing devices.

Wi-Fi 6 is steadily being incorporated into many districts' existing network infrastructures due to its high capacity. And much of the draw of Wi-Fi 6 is that it can be a part of the overall network infrastructure.

Beating the Ecosystem

But while you can have Wi-Fi 6 deployed, the entire ecosystem must be optimized to get the best experience for students, teachers, and staff as it is but one element of the network's bigger picture. A school may need to look at the aggregate capacity of its entire network stack, perhaps looking at updating switches, routers, and even firewalls.

It is advised that a school infrastructure should be examined at all levels when considering a Wi-Fi 6 rollout, from structured cabling needs to Wi-Fi 6–capable devices. For many schools and districts, this will be an ongoing process: upgrading devices as refresh cycles allow.

The ways that users are employing their devices—such as with the dramatic surge in video streaming — also favor Wi-Fi 6. Other areas that will expand and benefit greatly include Unified Communications, Cloud Computing, and Smart Devices, as well as Augmented and Virtual Reality. All of these will be driven by increased performance, lower latency, greater capacity, and more super-wide channels to connect.

Beginning at the End

Endpoint devices are often a weak link from a cybersecurity perspective. They're harder to control, especially in "Bring Your Own Device" environments that lack strong, centralized policies and procedures. Any measures that can harden devices are valuable, and Wi-Fi 6 is one of them. It includes the newest security standard, WPA3, which delivers simplified security and set-up, stronger encryption, and more robust authentication than previous wireless standards. Notably, one benefit of the new encryption standard is that it's designed to prevent attacks: even on open networks!

In terms of security—a crucial concern for many K–12 districts—Wi-Fi 6 routers include the WPA3 security protocols, which can make them more resistant to cyberattacks. Upgrading to Wi-Fi 6 can enhance wireless security systems by adding motion detection features. It will also deliver higher resolution video. With extensive Wi-Fi 6 coverage, the IoT (Internet of Things) becomes more powerful and offers up new possibilities for learning.

High-caliber connectivity—facilitated by Wi-Fi 6—is the best way to ensure that students and educators can work remotely without compromising quality or security.



Software that Works Hard

Another next generation infrastructure innovation is SD-WAN (software-defined wide area network). SD-WAN adoption offers networking advantages for K–12 schools through the reduction of complexity and improved performance across IT stacks. As opposed to a traditional WAN, SD-WANs decouple control and data planes to provide improved network control and visibility. This has the ability to incorporate a district’s existing physical routers and switches, offering simplicity and agility.



While more schools are moving to SD-WAN to improve network management and reduce total costs, most still rely on hybrid environments. In these cases, WAN optimization—which includes data caching (the reduction of data transfers required for students and teachers to access common network services); data deduplication (the reduction of redundant data transfers); and data compression (the reduction of the size of data packets to minimize needed transfer bandwidth)—helps networks to deliver on their performance potential. The combination of SD-WAN and optimized WAN can reduce total data transmission volumes while minimizing overall bandwidth use.

It’s no surprise that cyberattacks against K–12 schools are increasing. Outdated network configurations and undetected software vulnerabilities can pose significant risks for K–12 schools. SD-WAN solutions can help to reinforce a school’s defenses against cyberattacks.

By using software rather than hardware to monitor and manage network traffic, SD-WAN solutions offer transparency through aggregating network management in a single place, control through the ability to isolate certain components without isolating everything else, and simplicity through the decoupled nature of SD-WAN solutions.

While the evolution of cloud-based SD-WAN solutions puts school districts on course for broader adoption over time, slow and steady uptake informed by existing network requirements provides the most stable path to optimal network performance.

The Next Generation Starts With You

If you define, develop, test, deploy, support, maintain, and protect technology solutions for your school or district, you are responsible for the “central nervous system” of your institution, managing the computing systems and networks that enable learning and collaboration. You may interact closely with policymakers to ensure school-wide awareness of, and adherence to, cybersecurity policies. You may also be involved in interacting with external vendors for technology acquisition and support.

You matter to the organization because you enable everyone to teach, learn, communicate, capture data, process information, and manage the systems that modern education depends on. Critical assets, including confidential information and student data, can be properly used and protected because of your role.

Ed-tech professionals set the tone in a school or district. And leadership is the most important factor to influencing awareness and mindset. So by creating awareness for next generation infrastructure needs, you can create a culture that embraces next generation endeavors and best practices.



Infrastructure solutions from CDW-G

Learn more about infrastructure solutions to accelerate your district's transformation from [CDW-G](#).