Building a reliable WiFi network to support K-12 digital learning

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Although high-speed connectivity is now taken for granted in the vast majority of school systems, a deep dive into the data suggests the quality of WiFi service can vary widely from one school to another — and these disparities can hinder the ability of students to benefit from digital learning opportunities.

Students who lack access to reliable, high-speed WiFi in classrooms "struggle to participate fully in online learning, access educational materials, collaborate with peers, or develop the digital skills and literacies needed for post-graduate success," the U.S. Department of Education notes in its 2024 National Educational Technology Plan.[1]

Despite substantial investment in broadband access, inequities still exist from one school to another — and many students and teachers report that poor internet connectivity in classrooms is a barrier to using technology effectively for teaching and learning.

According to Speak Up survey data from the nonprofit Project Tomorrow, 60% of students in grades 9-12 and 46% of students in grades 6-8 say their classroom internet access is too slow or inconsistent. Among urban schools, the percentages are even higher: 84% and 66%, respectively.[2]

Teachers feel the impact of slow or inconsistent WiFi on their classroom instruction, too. While 41% of teachers in suburban schools note that internet connectivity is a barrier to their more effective tech usage in their classroom, 58% of their colleagues in urban schools are facing the same problem, a 17% point difference between the two teacher groups.[3]

The survey results indicate the need for better WiFi to support digital teaching and learning in many schools. Fortunately, the federal E-Rate program provides significant funding to address this need. The program provided $1.3 billion in funding for WiFi equipment and network switches in 2023.[4]

Planning effectively for WiFi needs

Careful planning is critical when building or upgrading a WiFi network. As you consider your needs, think at least five years ahead. Try to anticipate how students, staff and even interconnected devices will be using your network in the future, and plan for even more capacity than you think you'll need for additional growth.

Here are six factors to consider when planning your WiFi needs.

1. **Number of users.** How many devices will connect to your network through WiFi? Start with the number of students and staff you have, but you might want to plan on having more than one device per person (for example, a laptop and a smart phone or wireless sensor for collecting data during science class). Think about how many people will visit your buildings for special events as well, and don't forget about Internet of Things (IoT) devices such as networked security cameras or smart building sensors and controllers.

2. **Types of applications.** How do you expect students, staff and visitors will use your network? Different types of applications will affect network performance in various ways. For bandwidth-intensive activities such as video streaming and live online collaboration, think about how many people will be using these applications simultaneously and plan accordingly. For these kinds of applications (as well as for voice over IP), you can't have any tolerance for network latency. You'll also want the ability to prioritize certain types of traffic over others.

3. **Coverage.** Where do you want seamless WiFi coverage within (and around) your schools? Consider locations such as the auditorium, gymnasium, cafeteria and even outdoor courtyards and athletic facilities in addition to classrooms and media centers. True anytime, anywhere learning implies that students will have full network access wherever they are at school.

4. **Building architecture.** When planning the number of access points you'll need and their locations, consider the layout of your buildings and what they are constructed from. Materials such as cinder blocks, brick, rock walls or stucco are very dense and could block or reduce a signal. Water pipes also can affect the range of a WiFi signal.

5. **Existing wiring.** As you're figuring out the placement of wireless access points, keep in mind that each new access point will have to be wired to your network. What kind of wiring already exists within your buildings? How much of this existing infrastructure can you leverage for your WiFi upgrade, and how much new wiring will you need? How might this add to the cost of your project?

6. **Security.** Proper security is essential. Think about who you'll allow on your network and what privileges they should have. For instance, will you allow students to bring their own devices (i.e., known users, unknown devices)? Will you allow guest access (i.e., unknown users, unknown devices)? You must be able to control which groups have access to which types of resources using a network access control (NAC) solution — and you should have full visibility into what users and devices are connected at all times.

When thinking about how many devices will connect to your network with WiFi, consider your school's volume of:

• Students

• Staff

• Visitors

• IoT devices

Once you understand the extent of the coverage you want to work with your service provider to do a site survey. This will help you plan the number and location of access points you'll need to provide the requisite scope of coverage.

Managed WiFi: A reliable alternative

Another decision you have to make when upgrading your WiFi network is whether to purchase (and manage) your own equipment or choose a fully managed solution that is owned, installed and administered by a service provider.

Under a managed WiFi contract, the service provider is responsible for wireless network installation and management from the initial site survey to the end of the contract — including all troubleshooting, repairs and network optimization.

This hands-off, full-service approach to WiFi is eligible for E-Rate support (it's listed as "Managed Internal Broadband Services," or MIBS, in the program's Eligible Services List). Although you can enter into a multiyear contract for managed WiFi, you would have to apply for E-Rate funding separately each year. With a five-year budget cap of $167 per student on the pre-discount cost of Category 2 services, schools would be eligible to apply for E-Rate discounts on managed WiFi services costing up to $33.40 per student, per year ($167 divided by five).

Although it might be less expensive initially to purchase WiFi equipment, there are numerous hidden costs you should be aware of. For example, you'll have to set aside funding for maintenance and upkeep — expenses that can add up quickly.

Here are four key reasons you might opt for managed WiFi service instead of owning the equipment yourself:

1. **Flexibility.** When you purchase WiFi equipment, you're investing in a specific network infrastructure with a fixed capacity. If your needs change faster than you anticipated, or if you underestimated the demands on your network from the beginning, you'll be stuck until you can make enhancements. On the other hand, with a managed solution, you can easily add more capacity as needed — and as technology evolves, you'll always have access to the latest equipment.

2. **Reliability.** A managed WiFi service gives you peace of mind. You don't have to worry about maintaining, repairing or optimizing your network. With a managed solution, you have a service-level agreement (SLA) in place that guarantees network performance. If anything should happen, vendor support teams are available around the clock to troubleshoot and fix problems.

3. **Guaranteed expertise.** With a managed solution, you don't have to worry about having network technicians or engineers on staff. Fully experienced technicians are just a phone call, email or text message away.

4. **Fixed cost.** Managed WiFi results in a regular monthly or yearly expense that is a known quantity, with no surprises. This makes it easier to plan and budget. Some school systems also find it easier to pay a smaller fixed amount over time than to make large, up-front capital expenditures.

Benefits of managed services:

- Shifts budget from capex to opex.

- Creates an expertly-designed network to meet changing needs and new technologies.

- Provides 24/7/365 support from IT professionals.

Partner with a proven provider you can trust

With Spectrum Enterprise®, you don't just get a technology vendor, you get a proven partner who can meet all your connectivity needs. As your managed services provider, we offer an extensive, modern fiber network; a highly qualified team of IT professionals; local support teams; and an exceptional service-level agreement that gives you peace of mind.

Discover how Spectrum Enterprise can help you build a reliable network and help with your WiFi needs today.

Learn more

1. "A Call to Action for Closing the Digital Access, Design, and Use Divides," Office of Educational Technology, US Department of Education, January 2024.

2. "Unfinished Business: Unfinished business: Understanding the digital access divide in American schools," Project Tomorrow and Spectrum Enterprise, 2024.

3. Ibid.

4. "2023 E-Rate Trends Report," Funds for Learning.

About Spectrum Enterprise

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