

The WAN Is the Ceiling

Sizing district fiber transport for a cloud-first, device-dense decade: What E-Rate Category 1 funds, what it doesn't and what to evaluate before your next Form 470.

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The Ceiling Has Moved

Every district technology director I work with must answer the same question on a fixed federal calendar: Can the network carry what the district now needs it to carry?

In a district with one-to-one devices, growing cloud use and expanding analytics, the wide-area network (WAN) sets the capacity ceiling, and the next E-Rate Category 1 cycle is a natural planning milestone to reassess it.

First, a working definition, because scale affects the size of the problem. I use "large" to describe a district with roughly 10,000 to 25,000 students and "extra-large" for one with more than 25,000. These districts may operate anywhere from a dozen to several dozen school buildings under a single technology office.

The diligence outlined below applies to districts of any size. At this scale, however, the capacity requirements are larger, and the resulting architecture decisions are more consequential.

What runs across the network today is very different from what ran across it when a typical multiyear fiber contract was last signed. Bandwidth demand is now sustained, rather than concentrated in occasional peaks, driven by several forces:

- One-to-one and bring-your-own-device (BYOD) programs put more traffic on every site throughout every school day
- Centralized data analytics pull student information back to a hub from buildings that once stored their own records locally
- Student applications that once ran in a district data center are migrating to the cloud, driven by cost, vendor roadmaps and the operational burden of maintaining aging on-premises platforms
- Voice has been excluded from E-Rate funding since funding year 2019, leaving districts to fund voice services and equipment outside E-Rate

Each force developed gradually. Together they have reset the baseline the next contract must meet.

Why the WAN, Not the Wi-Fi

Many districts have already upgraded their buildings. They installed access points, switching and a managed wireless overlay funded under E-Rate Category 2.¹ That was the right work, and it addressed the Wi-Fi question. Since then, the bottleneck has moved elsewhere.

Now, the bottleneck is what happens between the buildings and everything else. Four loads, each once modest on its own, now combine to raise the floor of what the network has to sustain:

1. **Devices.** A one-to-one or BYOD program puts a Chromebook, tablet or phone in front of every student, and those devices stay online throughout testing, classwork and streaming. Sustained utilization across instructional periods is increasingly important alongside short-duration peaks, because both can affect application performance and capacity planning.
2. **Data.** Districts that used to keep student information system (SIS) data inside each building now pull it from many sites, including testing sites, to tailor curriculum to specific student cohorts. The analytics pipeline runs over the WAN. So do database refreshes, the dashboards principals open at the start of the day and the central platform the curriculum office uses to compare schools.
3. **Cloud.** More student applications are moving outside the district data center. Cloud-based productivity suites such as Microsoft 365 and Google Workspace are common across K-12 environments, and learning management systems increasingly run in the cloud as well. As more applications move off-premises, routine user activity shifts additional traffic onto the WAN and Internet egress.
4. **Voice.** The phone system used to be a separate service running on separate infrastructure. Today, districts are retiring aging on-premises platforms in favor of cloud-based and hosted voice that runs over the same WAN as everything else. It isn't bandwidth-heavy, but it's unforgiving traffic: A call tolerates no jitter or dropped packets, so the WAN now has to carry a real-time, latency-sensitive load it was never explicitly sized or prioritized to protect.

A circuit sized for the peak of the prior contract period is now below the baseline required for the next one. No amount of Wi-Fi inside the building can solve that, because the constraint lies outside it.

The Budgeted Window

This conversation happens on a calendar, rather than when the network actually fails, because of how the federal program that funds it is structured.

¹ Universal Service Administrative Company (USAC) <https://www.usac.org/e-rate/applicant-process/before-you-begin/eligible-services-list/>

The E-Rate funding year runs from July 1 to June 30; FY2027 covers services delivered from July 1, 2027 through June 30, 2028.² In recent funding years, the Form 471 application window has typically opened in January and closed in the spring. Because a Form 470 must remain posted for at least 28 days before the applicant can select a service provider, districts should work backward from the Form 471 deadline once USAC announces the filing window for the applicable funding year.³ Before a district can file a Form 471 for a competitive service, it must post a Federal Communications Commission (FCC) Form 470 inviting bids. The Form 470 must remain posted for at least 28 days before the Form 471 is filed.⁴

The contract signed during the next cycle must support the district's device, data, cloud and voice loads throughout its term. Form 470 is the public document that defines what the district is asking for. If it specifies the capacity, diversity and architecture the next term actually requires, the bids should reflect those needs. If it simply copies the prior cycle's specifications, the bids will reflect those as well.

What Category 1 Funds and What It Does Not

Sizing the primary path correctly requires a clear understanding of what the program will and will not pay for.

Category 1 funds the primary data transmission service. Leased lit fiber, leased dark fiber and self-provisioned broadband networks are all eligible.⁵ Discount rates range from 20 to 90 percent of the eligible cost, based on the district's National School Lunch Program participation rate. The highest discounts are reserved for the highest-poverty districts.⁶

What Category 1 does not fund matters as much as what it does.

Services that are purely duplicative for backup purposes are generally not E-Rate eligible.⁷ Multiple circuits may be eligible, however, when the applicant can demonstrate that each is necessary to meet its bandwidth requirements rather than merely providing redundant capacity. Where route diversity is required, the district should define that requirement based on its own technical needs and confirm eligibility under the current E-Rate rules.

Voice is not eligible.⁸ Whether a district is running an on-premises voice platform or plans to migrate to a cloud-based or hosted platform, it now must cover that cost with local funding, with no federal offset.

Managed services and security products are funded differently. Eligible managed internal broadband services and eligible firewall components may qualify under Category 2, subject to the applicable Category 2 budget and the current Eligible Services List. Services such as DDoS protection, SD-WAN and security functions beyond those listed as eligible under the standard E-Rate program generally require non-E-Rate funding. The FCC's separate Schools and Libraries Cybersecurity Pilot Program has different eligibility rules.

² USAC <https://www.usac.org/e-rate/resources/e-rate-productivity-center/funding-year-2026-filing-window/>

³ Funds For Learning <https://www.fundsforlearning.com/news/mark-your-calendar-fy2026-e-rate-filing-window-dates-announced/>

⁴ USAC <https://www.usac.org/e-rate/resources/e-rate-productivity-center/funding-year-2026-filing-window/>

⁵ USAC <https://www.usac.org/e-rate/applicant-process/before-you-begin/fiber-summary-overview/>

⁶ USAC <https://www.usac.org/e-rate/applicant-process/applying-for-discounts/calculating-discounts/>

⁷ USAC <https://www.usac.org/e-rate/applicant-process/before-you-begin/eligible-services-overview/>

⁸ Federal Communications Commission (FCC) <https://www.fcc.gov/general/summary-second-e-rate-modernization-order>

To keep each expense aligned with the right funding source from the start, sort the next cycle's spending into three buckets before the Form 470 posts:

1. **Category 1** for the transport
2. **Category 2** for managed Wi-Fi and the firewall portion of internal connections
3. **District capital or operating IT funds** for everything else (including voice)

Separating these expenses in the technology plan helps clarify which costs may be E-Rate eligible and which require district funding, supporting cleaner budgeting and application review.

Cloud Migration Is Also a Transport Decision

In many districts, the migration of student applications to the cloud is treated as a software project. The SIS, learning management system, productivity layer and testing platform may each move to a cloud vendor on a separate timeline with a separate integration plan.

When discussing the migration of student applications, the technology office should include the WAN in the conversation. The path supporting those applications determines how well they perform.

Cloud migration changes what the network has to carry. It moves application traffic that once terminated inside the district to external SaaS and cloud environments. As that happens, more routine application activity traverses the WAN and Internet egress, increasing the importance of sustained capacity, latency and routing performance during the instructional day.

Cloud migration also changes the network path applications depend on. As workloads move outside the district data center, Internet egress, routing, latency, resilience and security controls become part of application planning. The right architecture depends on the workload: some SaaS applications are designed for direct Internet access, while other cloud workloads may benefit from private connectivity, peering or a combination of paths.

The funding distinction is clear: The cloud subscription itself, including Microsoft 365 licensing, SIS hosting and the learning management system, requires district funding and is not E-Rate eligible. However, the underlying transport path may be fundable when it qualifies as the district's Category 1 service.

This is one of the demand drivers that does not show up directly on a Form 470. Instead, it shows up in the capacity number a district writes into that form. A district in the middle of a migration must understand, before posting, what the application load will be at full deployment rather than base its requirements on current usage.

Voice After E-Rate

If you're planning a migration from a legacy phone system to cloud-based or hosted voice, the traffic will run over the WAN. It is a relatively light load, but a performance-sensitive one: it is sensitive to latency, jitter, and packet loss and therefore needs appropriate quality of service (QoS) and path performance. Build in that protection while specifying the WAN for the next term. Don't wait until the voice load is already running over it.

The right time to evaluate a voice migration is while the district is planning its transport requirements, because both decisions affect the capacity and performance the WAN must support. The district can plan the two on the same internal timeline while keeping E-Rate-eligible transport and locally funded voice costs clearly separated in its procurement and budgeting process.

Sizing for the Term, Not the Day

There is a second sizing question the calendar forces. The contract being signed is not sized for this year's load — it's sized for the load expected when the contract expires. A Category 1 transport agreement often runs for multiple years, and the real planning question is where district demand will be over that entire term. For capacity planning, the district's own measured utilization and documented growth assumptions provide a more specific basis than broad per-user benchmarks, which are better used as external reference points.

Carry one caution into the next bid: Be skeptical of any capacity pitch that extrapolates a single year's growth rate forward indefinitely. Per-user demand is real, but it is maturing. As one-to-one deployment saturates, concurrency rather than raw device count sets the ceiling. What is not maturing is the aggregate load on the path itself. Cloud migration keeps moving traffic that once terminated inside the building onto the WAN and through Internet egress. As that continues, the gap between the Internet-access requirement and the higher WAN requirement narrows.

Several numbers can help determine the capacity to provision for the contract term. Start with each circuit's measured 95th-percentile load today. Project it forward using the district's own trailing growth rate, then add any incremental demand from planned cloud or application migrations that is not already reflected in that growth rate. The companion model uses 75% projected utilization as an illustrative planning threshold; each district should select and document the engineering threshold appropriate to its environment.

A separate set of reference points can help frame scalability. The FCC's scalable-capacity WAN target is 10 Gbps per 1,000 students, while SETDA recommends the capability to support 10 Gbps per 1,000 users. Treat these as external planning references, not as calculated district demand or required provisioned capacity.

If this method is applied to a representative large district with around 24,000 students and staff across a few dozen buildings, the numbers may look like this:

- Buildings start at around 1 to 2 Gbps and step up to roughly 2 to 5 Gbps over the planning horizon.
- Internet egress starts near 10 Gbps and reaches about 25 Gbps by the end of the term.
- The modeled WAN aggregate starts at about 32 Gbps and reaches about 71 Gbps by the end of the planning horizon. The external scalability benchmarks are shown separately and are not the district's projected demand.

These figures are illustrative. In this fictional example, aggregate building-access capacity is higher than Internet egress because the model sizes the WAN and Internet gateway separately from different measured loads.

Evaluate whether the underlying transport architecture can scale as demand grows, so increases in provisioned bandwidth may be accommodated without rebuilding the physical path. The appropriate capacity steps and contract structure should be determined by the district's own requirements.

In a large district, running this exercise surfaces three issues that smaller districts rarely confront at the same scale:

1. **Concentration:** Analytics, the SIS and cloud egress all converge on a central data hub and Internet gateway. That gateway requires its own large circuit, sized separately from the circuit serving any individual building.
2. **Heterogeneity:** A comprehensive high school and a small elementary school do not require the same circuit capacity, so the answer is a set of per-site tiers.
3. **Scalability:** External benchmarks become more consequential at district scale. The FCC's scalable-capacity WAN target is 10 Gbps per 1,000 students, while SETDA recommends the capability to support 10 Gbps per 1,000 users. These are planning reference points, not calculated district demand or required provisioned capacity.

A Capacity Diligence Checklist

These are the questions to answer about the district's network before the next Form 470 posts. A director of technology already has most of the data needed for these practical questions. The point is to put the answers in front of the people who fund and approve the contract.

1. **What is the sustained per-site bandwidth load today, by site type and time of day?** Peak is the wrong measure when the load extends across the entire instructional block. Use the 95th-percentile sustained load at each building rather than short-term bursts.
2. **What will the device count look like at full one-to-one or BYOD deployment, and which sites are not yet at that level?** Size for where the program is going.

3. **How much of the WAN load comes from the centralized analytics and student information system (SIS) pipeline — the cross-site data extracts, dashboards and reporting — and is it counted in the per-site number?** This traffic runs over the WAN throughout the day and is easy to leave out of a device-based estimate.
4. **Which student applications have already migrated to the cloud, and which are scheduled to migrate during the next contract term?** Each migration adds sustained traffic to the WAN and should be included in the capacity sizing.
5. **How is cloud-bound traffic provisioned today, and does the egress architecture match each workload?** Review Internet capacity, routing, latency, resiliency and security requirements, recognizing that some SaaS applications are designed for direct Internet access while other cloud workloads may benefit from private connectivity or peering.
6. **Where is physical path diversity documented, and where is it only promised?** A district that needs to fail over between buildings or to a backup site must know which as-built fiber paths are physically separate and which share a conduit, a vault or a building entrance.
7. **Is the district planning to migrate voice to a cloud-based or hosted platform during the next contract term? If not, when will the current phone system reach the end of its useful life?** If voice will move to the WAN during the term, the WAN specified today must be ready to carry it.

If the answers are clear, the district will be in a stronger position to define its own requirements for the next procurement. If some of these questions give you pause, they are exactly what the technology office, the business administrator and the board should resolve before the Form 470 posts.

Lightpath has been building and operating networks for over 30 years and serves more than 400 area school districts. Its network spans more than 12,600 route miles and reaches more than 18,000 service locations across 11 U.S. metro markets. Once the district has independently defined its technical and procurement requirements, Lightpath can explain where its fiber is available, how its routes are engineered and which service options may respond to those requirements. If that would be useful, we can have that conversation on the district's procurement timeline.

Capacity planning is only one part of preparing for your district's next network cycle. Once you have aligned on your requirements, the next step is evaluating whether prospective providers can actually meet them, including capacity, physical route diversity, scalability, latency, implementation, support and network ownership. Lightpath's Vendor Evaluation Guide provides practical questions you can use with any provider, including us, to compare claims against evidence.

[Download the Vendor Evaluation Guide](#)

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