

What's holding back the education industry:

How cloud networking
delivers a streamlined
and turnkey solution
that scales



Executive summary:

Education is unique to other industries. It serves a diverse population across multiple facilities, with disparate goals and with funding dependent on government, the community, and investments. At a glance, cloud computing is an ideal technology for education at both the secondary and post-secondary populations, but cloud adoption has been slow. CIOs face a number of obstacles such as tight budgets, unpredictable funding, an aging infrastructure, a population with varying needs, and security. However, OnX Canada can provide education with an informed tech landscape assessment and provide solutions such as SaaS, NaaS, and other cloud options to create a streamlined network operation.

Why CIOs are investing in cloud networking for education

The leading cause of identity theft is sensitive information being obtained from school forms and office documents. Students are desirable targets because they typically don't have blemishes on any kind of credit reporting system, and it may take years before a child realizes his or her identity has been stolen.

The challenge is that educational material and platforms are moving from the classroom to the cloud. IT administrators need to provide reliable access to these toolsets while securing the network from would-be hackers. While locked down and secure, it needs to be accessible anytime, from anywhere for students, teachers, and parents, but not for ill-intentioned identity thieves.

How does a school design a network to achieve the outcomes discussed above? Many have already turned to Network as a Service (NaaS) from OnX due to the advanced security components as well as the scalable aspect of an operational expenditure (OpEx) IT model.

NaaS provides a next-gen firewall with a full unified threat management platform. This offers intrusion prevention and detection (IDS/IPS), advanced malware protection, content filtering, web filtering, app filtering, and more. NaaS also offers an OpEx LAN PoE switching model to allow for the growth of the Internet of things (IoT) and a growing demand for new devices to connect to the network.

Additionally, with NaaS, school administrators can deliver the "always-on" connectivity across the school campus to allow students to learn in any environment. The Wi-Fi provided with NaaS is enterprise-class technology on an OpEx budget. NaaS Wi-Fi offers high-speed, high-density coverage to students while keeping their security as a top priority. The Wi-Fi offers identity-based authentication, rogue AP detection, landing page terms and conditions, and traffic shaping and content filtering. The traffic shaping allows schools to ensure the bandwidth needed for learning is not being used up by social media or streaming applications.



E-book overview

Cloud networking may seem ubiquitous in today's workplace, as it is used for everything from project sharing to storing photos to application management. Yet, while many industries have embraced the cloud, education has been slow to adopt it. What's behind the delay? Security, a lack of infrastructure, budget concerns and a poor understanding of the technology cause some to shy away from cloud migration.

However, the cloud is the ideal solution to address education's many tech challenges. Anything as a Solution (AaaS) options and the proliferation of public and inexpensive cloud solution will better connect a disparate customer base of administrators, faculty, staff, students, parents, and community, as well as multiple campuses and global learners and researchers, in a more streamlined and efficient manner. At a time when budgets are at a premium, school infrastructure can't keep up with demand, and more instruction is conducted via tablets and apps, finding ways to utilize the cloud will be a boon to educational institutions. Working with a recommended tech partner such as OnX makes the transformation to any of the AaaS options seamless and cost-effective.

The reasons behind the current state of cloud networking in education

Traditionally, education's decision-makers believe the costs involved with implementing cutting edge technologies like cloud computing are prohibitive. There is also a push to see an immediate return on technology when the reality is sometimes that the payoff is long term.

Education's relationship with technology, including cloud adoption, comes down to one primary issue: budget. For the most part, schools are not-for-profit business operations. Public schools rely on income from provincial and federal governments. Private schools rely on tuition money, donations, or endowment funds. There are disparities from one school district to another, between schools in the same districts. The situation is similar in higher education, where universities within one province or territory are funded differently than those in another region and colleges with multi-campus systems may not have equitable or transferable funding resources.

Budget constraints play a major role in education's ability to fund new technologies, and budgeting issues are a reason why schools tend to lag behind other industries when it comes to adoption of technologies, and that includes cloud offerings such as Network as a Service (Naas).

Funding for education varies from place to place, including when they file for funding requests and what they can include in those requests. This means CIOs and other decision-makers need to be exact with their requests, dealing with the most immediate tech needs. That could mean new computers or iPads in the classroom or upgrading the internal infrastructure. AaaS options aren't an immediate concern when looking at technology concerns.



Grant awards, either for general use or specifically for technology, are a welcome assist for technology. The problem with grant money is that it's unpredictable from one year to the next. A grant awarded one year may not be awarded the next. Because of the uncertainty involved, using those funds for a one-time purchase makes more sense than setting up a cloud service only to discover the money won't be available in the future.

Designating a budget for cloud computing is often hampered by a lack of understanding of what the cloud is and how it works. While the people who would most benefit from improved technology, the students and teachers, use the cloud in other areas of their lives, decision-makers have been slow to recognize how cloud services translate in the educational setting. What we're seeing is a disconnect between real-life activities and school-related systems.

Security concerns also loom over cloud adoption. Even cloud proponents acknowledge there are questions about data security within cloud environments, especially as news breaks almost weekly of a cloud-related data breach.

Children are a prime target for hackers, Jon Lloyd, director of cloud networking for CBTS and OnX, explained. Their personal information is rarely monitored in the same way adult PII is tracked, and stolen information may not come to light until years after the fact. Education's decision-makers are leery about putting information about students into a cloud environment because of the risks involved.

There is good news, however, that the barriers to cloud networking may be breaking down. According to *Dresner Advisory Services 2018 Cloud Computing and Business Intelligence Market Study*, education is expected to have one of the highest cloud business intelligence adoption rates across all industries in 2018. On July 10, 2019, Amazon Web Services (AWS), announced the launch of a Cloud Innovation Centre (CIC) at the University of British Columbia (UBC). The CIC is the first of its kind in Canada, and provides UBC students, staff, and faculty access to cloud technology to advance projects to generate community insights while learning to employ Amazon's innovation processes. Officially labeled as the UBC Community Health and Wellbeing CIC, powered by AWS, the Centre will serve as an innovation hub for student teams tackling real-world issues and challenges through the application of novel computing technologies. The CIC will change the way UBC teams use cloud technology, drive innovation, and improve agility and cost.

Budget constraints play a major role in education's ability to fund new technologies; because NaaS is a service, there is no capital expense (CapEx). Instead, the monthly subscription fee is billed as an operating expense (OpEx), which enables predictable, steady budgeting.



Benefits to cloud networking

The benefits of using NaaS and AaaS in education are two-fold, according to Jana Dorton, solutions enablement manager for OnX and CBTS.

1. Inherent capabilities

First, are the inherent capabilities from within the cloud computing devices that are available and are readily available to faculty, students, and staff. Access to the newest technology is an expectation, especially in higher education institutions. The virtual classroom is now a reality for almost any school, with readily available software through AaaS offerings. School districts incurring long weather-related cancellations can turn to the cloud to conduct remote in-class days, eliminating costly make-up days.

Children in the 21st century have grown up with devices that access the cloud and the latest technologies, and they expect to have at minimum the same access in school settings as at home. The ability to reach out to students in the ways they are used to learning, working, and playing makes the school more appealing, which could positively affect ratings.

Communication between faculty and staff, students, parents, and the community improves, as well. With the cloud, school districts would be able to streamline operations. Staff would be able to work in a more cooperative manner across schools within a district or across different districts or regions.

2. Scalability

Second, is scalability. A network site can be designed for an individual district or institution and then ensure that all school locations have that same design and follow the same set of rules and procedures. By utilizing technologies like Software as a Service or Infrastructure as a Service, you guarantee that everyone has access to the same applications that are regularly updated and patched, as well as adding another layer of IT support to what is already available in house.

Through the cloud, the networks can then be scaled to meet specific needs as schools grow or locations are shut down or temporary sites are set up. Cloud computing devices don't need additional internet connections or on-site servers.

Scalability means the district won't be bogged down if there is an influx of new students or staff in any given year. Everyone will be able to access applications through any cloud-enabled device at any time. Bandwidth shouldn't be a problem, either. Cloud services provide the bandwidth to transfer large files or conduct live streaming without interruption to other users.



The cloud can also keep IT budgets in check, as cloud expenditures are set on defined parameters and address the problem of tech obsolescence. Thanks to scalability, schools only pay for the services they need, as they need it. Because AaaS applications are regularly updated and patched, and because cloud applications can be accessed across a variety of platforms, hardware and software can be used for an extended period of time—no need to upgrade to the newest device version if it isn't in the budget. NaaS relies on minimal hardware needs, again cutting down on the need for a lot of computers, server rooms, or storage. Because your NaaS provider manages the entire service package, including firewalls, wireless access points, and security, your equipment upgrades are built into the solution. It allows you to have updated enterprise-class technology without worrying about replacing your hardware and at a set per-month cost.

Speaking of hardware budgets, the cloud gives school leaders the option of instituting a bring-your-own-device policy that allows students and staff to use personal devices instead of school-provided devices, saving money on volume and wear-and-tear.

Turning to a cloud service provider, education IT staff gets a support system. They have a backup of certified engineers who can support the internal staff with real-time updates and changes, as well as monitor the systems 24x7x365.

The obstacles to cloud networking

Financial issues have already been cited as the primary obstacle to cloud and overall technology adoption, but budget isn't the only pain point. Security and infrastructure are two other important issues that must be addressed and may be factors hampering cloud migration in education.

Protecting the sensitive information of students and staff must be a top priority. However, with cloud adoption, there is often confusion over who is in charge of security for the data. While the cloud provider should be open about their security protocols and what they are doing to protect their cloud both physically and virtually, in the end, it is up to the consumer to ensure that the data is secure. This puts some onus onto school CIOs and IT staff to ensure security policies are met. While the cloud provider will monitor potential security threats, it is up to internal staff to have a security policy in place in case the worst-case scenario comes to fruition.

Ensuring that the institution's network infrastructure will support cloud computing is another obstacle. It begins with bandwidth. "As applications migrate to the cloud, students and faculty members accessing those applications are now putting a strain on the internet or WAN connectivity. This leads to increased bandwidth needs and increased operational expenses," said Lloyd. "That means increasing operational expense."

Some of the top security threats to the cloud include data breaches, poor access management, malicious insiders, Denial of Service attacks, and poor due diligence in cloud security best practices.



And the infrastructure needs to be secured. With so many applications accessing the network through the cloud, a security system has to be built on the edge. “If you are directly sending data to the Internet and not through the network, we have to be able to secure that,” said Lloyd. Ironically, the security for the edge may come from a managed service provider that is able to set up security checks through a single portal, rather than have individual firewall management at each building site.

Lloyd added another infrastructure-related obstacle comes with user management. “As education takes learning out to the Internet, how do we identify who is misusing the Internet connection?” It rests on school IT to address Wi-Fi, LAN, or VPN options and who has access. Mobile management must also be addressed, including areas of shadow IT use, where users introduce unauthorized applications into the network. “Bring your own device (BYOD) has to be better controlled,” said Lloyd.

Future-proofing is another infrastructure-related obstacle for cloud adoption in education. With tight budgets, decision-makers need to look long-term—what technologies will stand the test of time? The Internet of Things (IoT) has created new infrastructure challenges. As everything becomes interconnected virtually, how can schools prepare for this? Additional power for Internet switching is needed. Connectivity will be necessary for every classroom with smartboards replacing whiteboards and students accessing cloud tools as part of their learning process. As more IoT devices are introduced into the network, how can schools build onto the infrastructure in a cost-effective way?

What the cloud can do

Unlike textbooks and buildings, cloud networking easily scales to the district's needs at the moment and with less impact on budgets. The cloud enables educational institutions to create a more flexible and more efficient infrastructure, custom-tailored to their individual needs. Cloud-based solutions provide the education industry with the ability to quickly and easily scale up during peak usage times, including enrollment, back-to-school season, and graduation; and scale down over breaks when your server needs are low.

“We offer our cloud computing technologies as an operating expenditure rather than as a capital expenditure,” Dorton explained. “What this does is gives the schools a predictable cost. Because it is predictable, they can plan the budget for one, three, five years ahead of time and know the rates will be the same.”

That predictability allows leadership to budget appropriately and invest money in other areas. In terms of cost-effectiveness, cloud providers work with IT staff to create policies and rules specially designed for each school, such as blacklisting inappropriate sites or designing cloud access for different age-appropriate groups, expanding this to personally owned devices as well as school-owned devices. At the same time, sites can be whitelisted for staff so they have access to information not intended for students or giving administration access to applications not meant for teaching staff.



With the cloud, IT staff have the ability to continuously monitor the system and make sure everything is running properly. Managed service providers offer IT managers on-site that work with the institution to screen for any potential security threats, both intentional attacks, and accidental incidents. This allows the school to better protect its network and helps to prevent costly hacks, even while using a public connection.

Turning to the cloud shifts the way schools approach learning materials. Take textbooks for example. How many hundreds of textbooks must be bought to accommodate each student? Because the books are expensive, they stay in circulation even if they are outdated, nor can additional textbooks be readily acquired if there is an increase in the student population. The cloud, however, offers e-books that are digitally accessed and shared. Software applications allow students to work more collaboratively with each other and their teachers in real-time, whether they are in the same room or from multiple campus locations. In higher education, the cloud offers opportunities to expand global learning with entire curriculums built online. A university could expand its enrollment by thousands of students without the expense of having to find space for them on campus.

In its *Top 10 Strategic Technology Trends for 2018* report, Gartner examined how technologies entwine people, devices, content, and services, referring to it as the intelligent digital mesh. This fits the education industry as they move to combine digital resources with current learning strategies. In particular, an emerging technology trend is edge computing, described by Gartner as “a computing topology in which information processing and content collection and delivery are placed closer to the sources of this information.” Within education, Jim Goodell, Liz Glowka, and Brandt Redd, wrote for *Getting Smart*, this nano-server network would allow data to move securely and dynamically between servers at a level closer to the users. This could be the solution to education’s broadband problems.

Research conducted by Rania Mohammedameen Almajalid found the first cloud technology many schools deploy is a basic email server for students, partnering with a managed service provider for the technology to set up and securely manage .edu accounts, and then moving to AaaS models to encourage collaborative e-learning options.

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Cloud options

It's clear that the benefits of cloud networking in education outweigh the obstacles. The hesitation to move forward on cloud adoption is often a lack of understanding of the technology. Cloud computing is confusing to non-technical personnel. The fundamentals might be familiar—that ability to access documents across a variety of devices using a simple application—but the nuts and bolts of the cloud are more complicated. The institution's CIO or CTO should lead the way but having a basic understanding of the cloud options available will assist leadership to find the best solution for its school.

First, know the difference between public and private clouds. The private cloud resides internally on a data server owned and operated by the organization, allowing them to be more secure, but expensive to scale while requiring internal staffing to manage.

A public cloud relies on a third party to manage your cloud services. Your data, applications, the AaaS environment is run through a public cloud. The benefit is someone else is managing cloud services so in-house IT staff can dedicate their efforts to other areas, but there are concerns about security in the public cloud. Because the cloud is hosted and managed by a third party, access to your data moves out of the control of the institution. Public clouds have suffered data breaches and other attacks, such as Distributed Denial of Service.

Hybrid cloud networking is an option that is growing in popularity. It is a mix of private and public clouds; how it is mixed is up to the organization. In education, an option is to store sensitive data like student and employee records on a private cloud but run applications through the public cloud.

Some of the most popular public cloud options used in education are Microsoft's Azure, Amazon Web Services, and Google. All three cloud providers have offerings specifically for secondary and post-secondary institutions. When choosing a cloud provider—and there are many others beyond these three, so it makes sense to shop and compare—it is important to know in advance what you want from your cloud. Is it to streamline IT functions across multiple locations? Is it to have the ability to store vast amounts of research data? Will the cloud host an employee and/or student work management platform?

The term "as a Service" is often used in conjunction with cloud computing. This is an offering of a particular technology provided by the cloud host to the customer as a service. Most well-known is Software as a Service, which are offerings like Office 365 or Google Apps. The software is maintained by the cloud provider, automatically updating it to the latest versions or patching vulnerabilities. Other AaaS options include Platform as a Service, Infrastructure as a Service, Security as a Service, Storage as a Service, Database as a Service—the list isn't quite endless, but the options available are numerous and flexible to fit individual needs. AaaS offerings cut down on overhead costs and, as mentioned earlier, allow schools to look at technology spending as an operational rather than capital expense.



Conclusion

Cloud computing can—and is—revolutionizing the way teachers teach and students learn. Now it is time for school leadership to get on board. While uncertain financial situations make leadership hesitant to adopt new technologies, cloud networking can provide budget stabilization. If budgeting for IT staff is an obstacle, a managed service provider can provide expertise to fill in the gaps and allow the CIO, CTO, and IT professionals the freedom to focus on other tech-related issues.

The cloud used to be a stand-alone technology, but today, everything is interconnected, making the cloud a necessity rather than a luxury. Technology in education needs to take a cloud-first approach if schools want to provide an optimum experience for students, staff, and leadership, as well as stay competitive. In the past, IT focused on audio-visual technologies and temporary in-classroom use. Now, as people become more disconnected to a room or a building while still wanting a real-time collaborative experience, education needs to be more cloud friendly.



Connect with an OnX Canada expert and begin your journey to the cloud today.