

CALGARY CATHOLIC SCHOOL DISTRICT

Canada's Calgary Catholic School District (CCSD) believes in longevity in its school system, which dates back to 1885, and in the network that helps operate those schools. After conducting a review of its existing design and architecture, CCSD decided it needed a flexible switch network that could last as part of a five-to-10-year roadmap. Enter Pica8 with its high-performance, open-standards PICOS® network operating system.

CCSD, a Catholic K-12 district of more than 115 elementary, junior high, senior high, and special education schools, serves more than 56,000 students in Calgary, Alberta and surrounding communities. The district puts a premium on using technology to aid in teaching and learning, as witnessed by its more than 16,000 Chromebooks and 40,000 unique Wi-Fi logins each day.

The Chromebooks are just one facet of the district's heavy use of wireless networking. Any switching solution the district opted for had to support integration with its Aruba wireless network.

With a lean IT team needing to cover a large geographic area, CCSD also required a solution that eased the complexity of network management and centralized major tasks such as upgrades and updates. The team is working to increase its use of automation and wanted to be able to program the network in an open-standards environment, a welcome change from its existing proprietary, closed, systems.

Like most educational institutions, CCSD has a tight budget for technology which is why any spend must be worth every penny. While most business environments follow a three-year refresh cycle, CCSD expects up to 10 years from its equipment.

"Other switch vendors intentionally design-in vendor lock-in specs so they can charge more," said Eric Villeneuve, Network Team Lead at CCSD. "The bare-metal white-box switches we are installing have the latest and greatest hardware specs, including modern switch ASICs, dual power supplies supporting full POE+ and some UPOE."

Finding Pica8

CCSD began its search for a new switching solution with the idea of rolling it out in a new school that would serve as a greenfield installation for the technology, then later integrate into all district schools. In addition to traditional switch vendors, CCSD evaluated the emerging field of white box switch vendors, which enable customers choose best-in-class operating system software and pair it with best-in-class hardware.

In the end, CCSD chose to partner with Pica8 and purchased its PICOS Linux-based open-standards NOS for its district-wide Layer 2/Layer 3 switching solution.

"While eager to update the overall architecture, CCSD wanted a solution that would enable its IT team to mimic the network configurations they were already familiar with," said Greg Michaels, Director of Sales Engineering at Pica8.

Pica8's expertise in architecting enterprise campus networks with spine and leaf switching topologies is well-suited to CCSD's predominantly north/south traffic, where a majority of traffic heads to the data center or out to the Internet on a 10G bit/sec pipe. The network has little east/west traffic, except for accessing local printers and devices.

The Benefits of Networking With Pica8

CCSD wants to be unshackled from a proprietary environment and appreciates Pica8's 85 per cent to 90 per cent feature parity to what is typically available in much pricier proprietary offerings. Enabling the IT team to select from a wide variety of free network management, monitoring and analytics tools was a tremendous benefit in terms of cost and flexibility. For instance, to manage its switches the CCSD team is incorporating open source tools, including developing Ansible templates and Python automation routines. Pica8 also allows them to easily connect with Microsoft's Azure, Amazon's AWS and other cloud-based network function virtualization (NFV) tools.

Integration with the existing Aruba wireless network was also non-negotiable in CCSD's switch decision. CCSD has made a large investment in its wireless assets and it was important that its switch solution be able to interact seamlessly with Power over Ethernet (PoE) components and support up to 48 POE+ ports, which the Pica8 solution does.

The Pica8 switch system features perpetual licensing, which frees customers from long-term, complex maintenance contracts that would be overkill for a school district. "Once a school district installs the network, there aren't a lot of control changes that need to happen over the long term," Michaels says.

The IT team enjoys the standardization and centralization afforded by PICOS to perform network management tasks such as upgrades, patches and configuration changes, which can be deployed to every school at the same time. If a bug or other issue occurs, IT can easily roll back switches to their previous state with a single reboot. Pica8 facilitates maximum network control without massive complexity.

That "control without complexity" mantra extends to voice and video over IP. CCSD has a vast network of VoIP phones and surveillance cameras. With PICOS, VoIP phones and video over IP are plug and play. The switches instantly recognize the devices, provide them the correct IP address and prioritize quality of service in line with the district's preferences. For instance, PICOS can differentiate between security camera traffic traveling to the data center to be stored and traffic streaming locally to security monitors.

CCSD is also using Pica8 to replace the current Layer-3 responsibilities of its ISP by adding L3 gateways directly on relevant Pica8 switches. This way CCSD does not have to call its ISP every time it needs to add a new subnet to the district-wide topology.

Positioned for Future Enhancements

Pica8's dual control-plane CrossFlow™ technology, which provides software-defined networking (SDN) capabilities, was also a factor in the CCSD decision to adopt PICOS. "Crossflow gives us a path to move towards SDN without having to rip and replace, which no other vendor truly offers," Villeneuve said. "We are going to be working on use cases to leverage it."

Such use cases may include boosting network security by providing dynamic control of traffic on both ingress and egress at a granular level. If, for example, someone brings an unauthorized laptop with a virus onto the network, CrossFlow can block the threat within seconds, mitigating the risk that such rogue devices typically pose in school environments. CrossFlow can also be used to isolate traffic for other security purposes (e.g., cameras and card readers) or for monitoring flows of interest.

Pica8's PICOS also supports a spine-and-leaf architecture that enables organizations to leave behind legacy protocols such as Spanning Tree Protocol (STP) and stacking architectures. In the future, CCSD plans to use Pica8's Multi-Chassis Link Aggregation (MLAG) capability to avoid the slowdowns that occur when STP recalculates routes. With MLAG, if a physical switch fails, CCSD can simply remove the switch, plug in another one, and it will reconfigure itself, reducing downtime and offering true zero-touch provisioning.

When You're With Pica8, You're Family

When it comes to customer service, most major vendors tier their responses to customers based on the customer's company size or the dollar amount of their purchase. Conversely, much as the major networking vendors used to do when they were smaller and more nimble, Pica8 treats every customer like a Fortune 50 company. Immediately, CCSD was given direct access to the Pica8 support team, which surpassed the district's expectations.

For instance, the CCSD IT team requested a feature that would let it program in additional VoIP phones beyond the eight listed in the legacy organizationally unique identifiers (OUI) tool. By the next morning, the Pica8 team had a custom patch ready so CCSD could enter its full inventory of VoIP phones.

"It's important to us that every customer gets top-notch treatment. Other vendors either put you in a queue or deny your request because you're too small. We go more than the extra mile to help you troubleshoot and solve any issues," Michaels said.

ON THE HORIZON

CCSD plans to continue its legacy refresh by deploying Pica8 into the other schools.

"With Pica8, we feel we're getting a powerful network OS, higher quality switches for improved performance, and quicker response times for support issues than we've received from larger brand-name switch vendors," Villeneuve said. "I'm surprised more organizations haven't caught on to the obvious advantages of open white box networking."