OPEN NETWORK BRINGS CITY OF HOOVER, ALABAMA, INCREASED PERFORMANCE AND REDUNDANCY AT LOWER COST TO TAXPAYERS

Pica8's PICOS® Network Operating System and open Edgecore switches exceed expectations as they simplify network management and configuration while bringing up to 40G of capacity to each wiring closet.

Faced with an aging network that was unnecessarily complex to manage and full of unwanted/unnecessary features, the City of Hoover, Alabama, decided to go in a different direction with its network refresh. Inspired by the success that Google and others have had with open networking, the city implemented a new network based on white box switch hardware and an open network operating system from Pica8.

The Result:

A modern, highly reliable network with dramatically increased bandwidth that's easier to manage and costs about 35% to 40% less than the proprietary alternative the city was considering.

"We wanted to bring in the best equipment and software we could yet be cost-efficient as this is all being paid for by taxpayer dollars," says Jason Cope, Director of Technology for Hoover, a city of 85,000 located outside Birmingham. "Cost reduction was a big factor but so was getting all the functionality that we needed to grow and improve our network over time. The combination of the Pica8 PICOS® NOS and Edgecore hardware enabled us to achieve that goal. It gives us a real future-proofed network – something that legacy networking vendors seem to shy away from."

The Problem – and Solution

The project began in 2015 when the city was looking to reduce its maintenance costs while positioning itself to support forthcoming technologies such as software-defined networks (SDNs), said Greg Boykin, City of Hoover Information Systems Manager. The city's existing network was predominantly Cisco, with some HPE switch chassis in its data center.

With their incumbent vendor, Cisco, the city was paying for licenses that had far more functionality than the city needed, making the Cisco solution not only expensive but overly complex to administer. "We also wanted to get away from anything proprietary," Boykin says.

After reading about how Google simplified its data centers using open network concepts, he looked into one of the vendors mentioned in the article – Pica8.

"In 2017, our new mayor and city council invested a large amount of funds that allowed us to upgrade our IT infrastructure overall, including the Pica8 PICOS network operating system," Cope says. "Without their support, none of this would have been possible. Their funding and support along with a reexamination of our vendors allowed us to efficiently address our IT infrastructure needs."

With the help of a local IT solution provider, Logista Solutions, the city decided to try the open network concept by deploying eight switches in its data center and one in the backup data center at City Hall, connected by an existing fiber optic cable. This was no low-level proof of concept, however. Rather, the switches would support all of the city's operations information systems, including telephone, public safety systems and emergency operation centers.

Originally the city built two separate networks between the facilities, with one backing up the other, but has since implemented the Open Shortest Path First (OSPF) protocol to create a fault-tolerant meshed network for redundancy.

"The goal was to provide base IP transport infrastructure with redundancy, high capacity and low latency," Boykin says. Redundancy is crucial, given the network supports the two 911 and emergency operations centers. "Those are the brains the city uses when fighting an emergency, whether it's snow or a tornado," Boykin says. The city wanted a seamless failover in case of a network failure – which hasn't happened yet.

As for performance, on Day 1 the network supported 10G links – subsequently upgraded to as much as 40G within the data center. "Our ping times and response times have gone from 2-4 milliseconds to sub-millisecond for any user anywhere within the facility."

AT A GLANCE

City of Hoover, Alabama

Pop: 85,000

PROBLEM
- Aging Cisco, HP network infrastructure
- Complex to manage, burdened by unneeded features
- Expensive licensing costs

SOLUTION
Pica8 PICOS network operating system running on open Edgecore network switches implemented in nine city buildings, including two data centers.

BENEFITS
- Increased performance: sub-millisecond response times throughout network
- Simplified management and configuration: flatter leaf-spine architecture
- 35% to 40% cost savings vs. proprietary solution
- Fully backward-compatible with remaining legacy networking infrastructure

Continued Growth

Now the city is bringing that kind of performance to additional users in nine buildings and counting. These nine facilities include the rest of City Hall, plus police and fire stations; the senior and recreation centers; and a library.

In all, the city has about 50 Edgecore switches with the PICOS NOS installed at the various sites. They support two 10G-to-20G connections to each wiring closet, bringing up to 40G total capacity to each closet.

This upgrade will bring those sub-millisecond response times to users throughout the city. "A big factor in the upgrade was improving performance for our power users," says Cope, who notes the network eliminates the bottlenecks the previous network faced with 1G connections to wiring closets.

The PICOS NOS also enables the city to implement a modern two-tier leaf-spine network architecture that accounts for some of that performance increase. While the flatter two-tier leaf-spine architecture is common in data center networks, the traditional three-tier network architecture still dominates in the wider enterprise. Enabling leaf-spine to be implemented throughout the network means any node is only a single logical hop away from any other, which lowers latency and improves performance.

Simplified Management, Great Support

The new network is also significantly easier to manage. "It's a much simpler network stack to deal with," Boykin says. "And we're monitoring a lot of individual switches, servers and devices now that we weren't before."

Deployment was likewise a snap because the city has a centralized server from which it pushes out pre-programmed switch configurations. "When it comes time to implement, we now spend more time unboxing, racking and stacking than configuring," he says.

The City of Hoover has also enjoyed sound support from both Logista Solutions and Pica8. Logista does a lot of the required footwork, Boykin says, including getting questions answered, handling switch specs and pricing. "They are very much like a partner to us," he says.
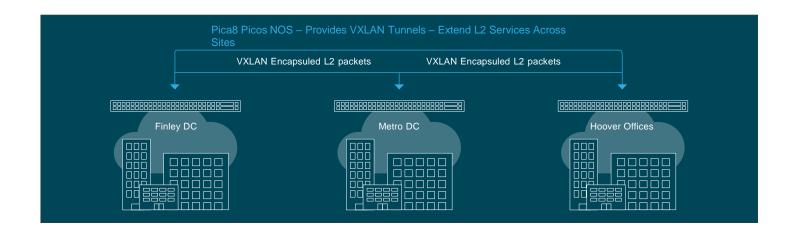
On the three or four occasions when he's had to directly reach out to Pica8 for support, they did not disappoint. "Pica8 has been outstanding as far as response to questions and providing suggestions on different ways to accomplish what we're trying to do," Boykin says. "It's good to know we have them there if we need them, 24x7."

Positioned for the Future

Now the City of Hoover is indeed positioned for the future, as the Pica8 PICOS NOS seamlessly supports features including SDN. In fact, the PICOS Crossflow™ software supports Layer 2, Layer 3 and SDN traffic over the same switch ports at the same time – an industry first. This paves the way for new levels of security and policy management. For example, virtualized security functions can now be delivered over the same ports as L2/L3 traffic, enabling solutions that detect and deflect rogue traffic in real time.

And Pica8's new AmpCon™ automation framework makes switch deployment even easier by fully automating the configuration of hundreds of switches. It ensures the correct software version is installed for each switch and provides perpetual license management, configuration updates and more. PICOS users can also opt for the TURBO Stacking™ software package that allows white box switches to replace legacy three-tier architecture campus chassis switches and switch stacks with a two-tier leaf-spine configuration that can be managed as a single, logical IP address.

Already, though, the City of Hoover network has "more than exceeded" expectations, Boykin said. "And the savings we're getting on support and software and hardware maintenance are substantial."

Pica8 Picos NOS – Provides VXLAN Tunnels – Extend L2 Services Across Sites

VXLAN Encapsuled L2 packets   VXLAN Encapsuled L2 packets

Finley DC   Metro DC   Hoover Offices