

Large School District Deploys Open Networking with Dell Technologies and Pluribus Networks

Dramatically Improves Performance, Visibility and Security While Saving Significant Money for Their School District

With more than 100,000 students, 110 schools and 12,000 employees, this school district is one of the 30 largest in the country. While the district invests heavily in the technology required for a 21st-century education, they operate with a small IT team that is responsible for everything from back-office human resources and finance systems to student testing and internet access, along with the necessary and appropriate firewalls and filters.

Phase 1: Initial Data Center Upgrade into a Cisco Brownfield Environment

With a rise in application traffic throughout the entire district, the IT team realized that they needed to upgrade the performance of their switches and would also benefit from enhanced visibility into traffic, applications and services. While they knew it was time for an upgrade to the data center, they also realized that neither the budget nor the size of the team was going to increase. As an existing Cisco customer, it was clear that a vertically integrated Cisco solution was going to be too expensive.

With cost consideration top of mind, the team evaluated open networking solutions that could offer advanced software-defined networking (SDN). The only two full-featured SDN solutions, based on open networking, that worked out of the box were from Pluribus Networks and another vendor that we will call vendor B.

1. They quickly determined that vendor B would be a challenge to insert into an existing Cisco network because of their OpenFlow approach - the leaf switches would not be able to interoperate with a Cisco spine and other Cisco devices.
2. As a greenfield-only solution, vendor B did not have enough experience inserting into Cisco environments, making a potential integration even more difficult.

3. Finally, with the smaller size of the district's environment, they realized that the cost of redundant controllers would make vendor B's solution too expensive for this deployment.

With Pluribus' distributed SDN approach (meaning the SDN control intelligence runs on the processor inside the switch itself), the cost of the redundant controllers was eliminated, making the solution much more cost effective. Additionally, this "controllerless" approach does not use OpenFlow but instead uses standard Layer 2 and Layer 3 protocols for the underlay. The IT team realized that they could easily insert the Dell Technologies/Pluribus solution into their existing Cisco environment, including connecting with their existing Cisco Nexus spine switch. Finally, after a few conversations, they realized that Pluribus brought deep Cisco expertise to the table, both in terms of product integration and technical support.

"We Have Made a Good Decision"

After putting the initial solution into production, the IT team received positive feedback from users on application performance. The open networking solution was delivering high-performance 10G/40G data center switching as planned. However, they quickly realized that the solution offered a lot more than just performance. It offered a very powerful and cost-effective tool to monitor traffic at 10G rates with no expensive probes or packet brokers and the ability to react to security threats almost instantly. The visibility and analytics Pluribus delivered to fabric-wide traffic is used by the IT team internally to monitor by source, destination, protocol type and volume of traffic, which helps them improve performance for their users. The visibility and graphical representation of traffic anomalies from Insight Analytics was so much better than the reporting provided by their firewalls that they began using Insight Analytics to tune the firewalls.

Phase 2: Expanding the Network for Increased Visibility

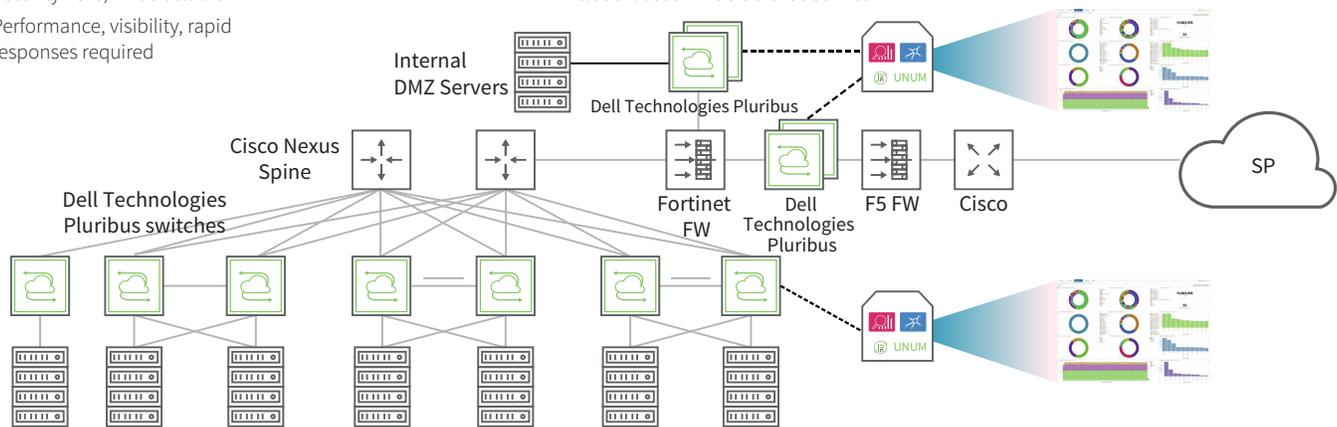
With the increasing sophistication of students and number of security attacks, the IT team decided that they wanted to further increase visibility. They reached out to Dell Technologies Networking and Pluribus to create an updated architecture that improves visibility and security. A high-level design is shown in the figure below.

School District Use Case

- ~120K students, teachers and staff
- Traffic from 110 schools
- IT responsible for CIPA compliance, internet, student testing, back office apps, etc.
- Security risks, DDoS attacks
- Performance, visibility, rapid responses required

DELL Technologies | Pluribus NETWORKS Why Selected?

- High performance, white box economics
- Interoperates with existing Cisco spine switch and routers
- Deep visibility of all traffic, no \$\$ probes
- Leverages Pluribus Insight Analytics to **avoid \$400K** subscription to cloud-based DDoS defense service



On the internal network, the IT team has now deployed seven Dell EMC ON switches running Pluribus Netvisor® ONE with the Adaptive Cloud Fabric™ as a single fabric. They have SQL clusters of web servers connected to Dell EMC open networking switches with Pluribus software at the top of the rack. They have deployed a separate fabric connecting the DMZ region and external-facing F5 firewall. They have deployed firewall filtering for north/south and east/west traffic, including inspecting and decrypting SSL traffic and inspecting applications using the Fortinet firewall for CIPA compliance. This is now effectively a double layer of firewalls combined with deep visibility from the Pluribus/Dell Technologies data center fabric.

Not only do data center users get great performance, the IT team can support many performance management use cases, allowing them to quickly pinpoint performance issues, accelerate troubleshooting, improve operational intelligence, identify security risks and speed remediation.

Open Networking with Dell Technologies and Pluribus

This architecture includes the following deployed Dell Technologies hardware products:

- S4048-ON
- S4048T-ON
- S4148F-ON

Distributed denial-of-service (DDoS) attacks are a regular occurrence for the IT teams of all educational institutions. Most often they are a nuisance, but sometimes they can be a threat to the availability of network infrastructure. Recently, a large DDoS attack targeted the main school district website.

- Using telemetry from Insight Analytics, the IT team was able to determine within minutes that it was limited to a couple of IP addresses from a nearby college.
- With the SDN capabilities of the Adaptive Cloud Fabric, they shut down the port “fabric-wide,” instantly stopping the DDoS attack in its tracks.
- School districts of similar size are paying upwards of \$400,000 per year for a subscription to a cloud-based DDoS prevention service.

Bottom Line: The IT team cleverly used white box infrastructure, Insight Analytics for detection and SDN control to take instant action across the fabric, thus avoiding this huge annual expense.

The Dell EMC Networking S-Series S4048-ON and S4048T-ON are ultra-low-latency 10/40 Gigabit Ethernet (GbE) top-of-rack (ToR) switches built for applications in high-performance data center and computing environments. The Dell EMC S4048-ON and S4048T-ON support the open source Open Network Install Environment (ONIE) for zero-touch installation of alternate network operating systems such as the Pluribus offering.

Pluribus software deployed included:

- **Pluribus Netvisor ONE**, a Linux operating system purpose-built to optimize the power and performance of bare metal open networking hardware. It is based on the open source FRRouting routing project and is instantiated in one or more lightweight containers on bare metal leaf-and and-spine switches, offering a rich set of Layer 2 and Layer 3 protocols.
- **Pluribus Adaptive Cloud Fabric**, a distributed SDN implementation that radically simplifies network operations with the power of fabric-wide automation and troubleshooting, while improving performance and reducing latency with fully distributed network services. Pluribus' controllerless SDN approach delivers operational efficiencies by federating all the switches together in a single programmable entity. This provides the IT team a level of operational simplicity that dramatically reduces both operating costs and the potential for human error.
- **Pluribus UNUM™**, a unified management platform that integrates a comprehensive range of advanced management capabilities. It enhances the intrinsic automation of the Adaptive Cloud Fabric architecture with workflow automation, topology visualization, network diagnostics and integrated performance analytics.
- **Insight Analytics (IA)** is a powerful integrated analytics module within the Pluribus UNUM platform that provides the IT team with proactive insight into network and application performance to ensure peak operating performance and meet user experience expectations. Insight Analytics leverages embedded Netvisor monitoring telemetry and packet flow data sources to enable pervasive visibility across the network, eliminating the need for expensive probes or complex monitoring overlay networks.



“Visibility into traffic”

Submitted by a Systems Engineer in Education

★★★★★ Overall User Rating

Product(s): Insight Analytics, Pluribus NOS, Pluribus Switches

Overall Comment: “We needed visibility into our network traffic for troubleshooting purposes and to investigate DDoS attacks to mitigate. Pluribus Networks provided that visibility and provided us a way to block and mitigate DDoS attacks in seconds.”

★★★★★	Evaluation & Contracting	★★★★★	Integration & Deployment
★★★★★	Service & Support	★★★★★	Product Capabilities

Bottom Line

The move to open networking and next-generation software-defined networking has delivered significant financial, technical and operational benefits to the school district. They've upgraded their data center infrastructure, running higher speeds with greater capacity for improved performance for students and employees across the district.

For the IT team, they're heroes for saving significant costs and benefiting from enhanced visibility and analytics, as well as delivering operational efficiency with the fabric-wide automation of the Adaptive Cloud Fabric.

- Open networking economics, with best-of-breed software from Pluribus
- No expensive redundant controllers to buy and deploy
- True automation via SDN control of the entire fabric that “just worked”
- Easy insertion into existing brownfield Cisco environment
- Robust analytics at wire speed without expensive probes or packet brokers
- Great visual reporting and simple management

The school district now has a world-class data center infrastructure to match its world-class education.