FernUniversität in Hagen (the University of Hagen) selects Arista Networks for major campus upgrade to deliver enhanced reliability, performance and automation.

Highlights

Challenge

With an aging network offering poor reliability and limited scope for expansion, the FernUniversität in Hagen migrated to an Arista spine and leaf architecture offering enhanced performance, reliability and scalability with deep support for automation along with reduced energy consumption.

Solution

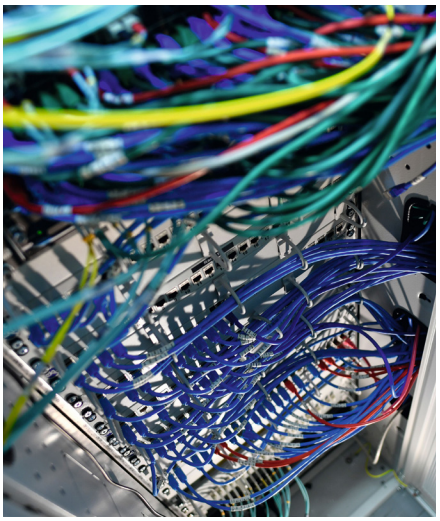
- Arista 7000 series spine and leaf switches for high performance, low latency, and scale
- Arista EOS® software and API for seamless integration with Ansible automation
- 100G core with 10G interlinks with capacity to grow in line with future demands

Results

- VXLAN implementation for flexible network segmentation and efficient data routing
- Streamlined both migration and ongoing management tasks through automation
- Resilient design delivers 100% availability since deployment
- Success of project led to Arista selection for data centre and WLAN upgrade

FernUniversität in Hagen, Germany's only state-maintained distance education university, embarked on a network upgrade, changing to Arista Networks to enhance bandwidth, reliability, and incorporate network management automation. They selected Arista for its uniform operating system across devices, which simplifies management and supports robust automation capabilities, including Arista's own management platform CloudVision® and Ansible integration. This leaf-spine architecture and EVPN/VXLAN technology has improved performance, security, and manageability across the campus.

FernUniversität in Hagen



Company Background

FernUniversität in Hagen is a public research university located in Hagen, North Rhine-Westphalia, Germany. It is distinctive for being Germany's only state-maintained distance learning university, and one of the largest in the world with more than 70,000 students. Established in 1974, the FernUniversität in Hagen offers a variety of undergraduate, graduate, and postgraduate programs across various fields of study, including business administration, computer science, law, psychology, and educational sciences.

The university's unique approach to education allows students to study from anywhere, making it especially attractive to those who need to balance their studies with professional or personal commitments. FernUniversität in Hagen maintains a rigorous academic standard and provides a comprehensive support system for its students, including online forums and virtual office hours with professors, as well over 50 study centres across Germany as well as other European countries, integrating a blended learning concept that combines online studies with in-person seminars and preparatory classes for exams.

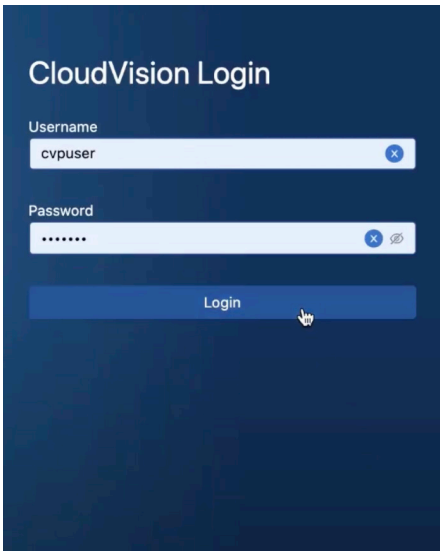
Challenge

To support its main campus and distributed suites, the FernUniversität in Hagen has invested heavily in IT infrastructure to support its students and staff, especially with the increasing use of high-quality video and software applications. Much of its IT systems are hosted on its main campus in Hagen, but as this has grown over the years, the IT team have run into significant challenges.

The legacy campus network utilizes a vast array of Layer 2 switches, anchored by two routers for subnet gateways and static routing, extending VLANs across the campus as needed. Redundancy is ensured through Rapid-PVST+ and HSRP protocols, but without employing stacking or MLAG. This setup led to recurrent stability issues, notably traffic storms, and challenges in isolating and resolving these problems. The network's aging infrastructure predominantly supports 100Mbit/s and 1Gbit/s access ports, with a maximum of 10Gbit/s for inter-switch links. The lack of high-capacity ports and absence of MLAG necessitated cascading switches, forcing network packets to traverse through multiple switches across the campus, impacting efficiency and performance.

With demand for network services increasing, the University began to consider possible upgrade paths, "We had three main goals," explains Markus Schweitzer, Network Engineer for FernUniversität in Hagen, "Firstly we needed increased bandwidth to support the sheer volume of content we have moving across our network, next we needed to ensure reliability with the ability to grow as needed. And finally, we were keen to build automation into the network management side to allow us to better adapt to future requirements."

With clear goals and a desire to implement a leaf- spine architecture to improve performance, Mr. Schweitzer and his team began evaluating several possible solutions. As a public sector organisation, a formal tender was issued, and four respondents were evaluated under EU mandated guidelines.



Solution

In 2023, FernUniversität in Hagen selected Arista Networks as its network infrastructure supplier for several compelling reasons, emphasizing efficiency, uniformity, and advanced technology integration. "A key factor in this decision was Arista's consistent use of its Extensible Operating System (EOS®) across both campus and data centre products," explained Mr. Schweitzer "This uniform operating system simplifies provisioning by using a single binary image for both access and data centre switches, ensuring streamlined operations and maintenance."

"Arista's robust support for automation was another significant advantage," says Mr. Schweitzer, "The availability of CloudVision, alongside comprehensive support for Ansible through Arista, offers flexible and powerful options for network automation. This facilitates efficient network management and the seamless integration of network operations into broader IT automation strategies."

The leaf-spine deployment equips each building with two Arista DCS 7050SX3 switches as leafs, interconnected via MLAG to ensure robustness and reliability. For the Spine, the Arista DCS 7050CX3 spine switches are strategically placed at two different campus locations. This setup connects all leaf switches to both spine switches using high-speed 100Gbit/s links, establishing a backbone of rapid and efficient data transport across the campus.

This network infrastructure is further refined using EVPN/VXLAN technology, with BGP as the chosen routing protocol for both the foundational layer (underlay) and the higher layer (overlay) networks. The implementation of VXLAN technology allows for flexible network segmentation and efficient data routing, promising futureproofing of the network with the division into different Virtual Routing and Forwarding (VRF) instances. To ensure security and control, traffic within the same VRF is managed via Access Control Lists (ACLs), while traffic moving between different VRFs is meticulously inspected by routing it through a dedicated firewall cluster.

Within the buildings, the network's reach is extended to individual devices through access switches from the CCS 720XP and CCS 720DP series, which are linked by 10Gbit/s inter-switch connections. This layered approach not only maximizes the speed and efficiency of the network but also enhances its security and manageability, laying a solid foundation for a cutting-edge campus network.

Conclusion

Although the network upgrade is still ongoing, important benefits such as improved performance, reliability and enhanced automation have already been recognised. The automation process began within the old network to achieve three main goals: create a vendor-neutral database for access ports, enforce rules across various devices, and facilitate the migration to new infrastructure seamlessly. "We created a plugin for the Ansible automation platform to adapt to each manufacturer's configuration language," explains Mr. Schweitzer, "The consistency across Arista's EOS switches significantly benefited this integration, streamlining the inclusion of EOS switches into the network's automation framework."

"We also used eve-NG for simulating the latest EOS images prior to deployment which allowed us to conduct testing and validation of the new infrastructure's functionality and manageability. This preparatory step ensured a smooth transition between the old and new network setups, effectively leveraging automation to enhance network efficiency and reduce potential migration issues," he adds.

With the first entire building now moved over to Arista, an important milestone has been reached in terms of the stability and security of the Campus network. An unexpected benefit has been lower energy consumption owing to the energy efficiency of Arista switches that has added to the success of the project. "The reduced need for cooling must be taken into account here," says Mr. Schweitzer, "and in individual cases it also seems possible to do without cooled network rooms which is a major benefit." Looking to increase the performance of their wider network, the success of the Arista campus network upgrade has prompted the university to renew their data centre architecture with Arista network devices, as well as beginning testing of Arista WLAN infrastructure.



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