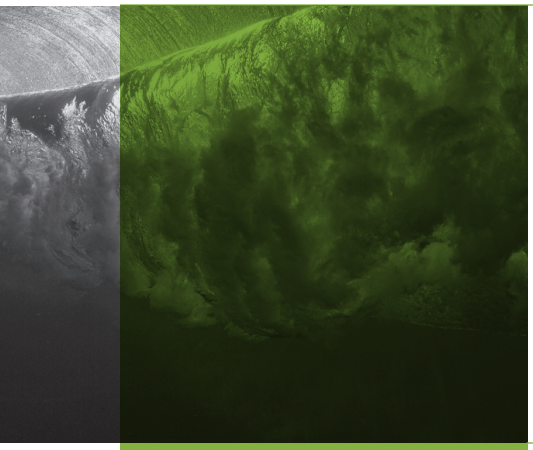


SURFNET BUILDS OPEN, PROGRAMMABLE NETWORK TO BETTER SERVE DUTCH UNIVERSITIES AND RESEARCHERS

Summary

Company:
SURFnet

Industry:
Research and Education

Business Challenges:
Build advanced research and education network with fully automated deployment of services.

Technology Solution:
- *MX2008, MX960, MX480, MX240, and MX204 5G Universal Routing Platforms*
- *Contrail Networking*
- *NorthStar Controller*
- *vSRX Virtual Firewall*

Business Results:
- *Improved service levels and flexibility with automated service deployment*
- *Built a multifaceted self-service network*
- *Moved to the vanguard of network automation and programmability*

Ruben van den Brink is on a mission: he is leading the team that creates the next-generation network (SURFnet8) of SURFnet, the Dutch national research and education network (NREN). His goal is nothing short of achieving the fully automated deployment of services.

"SURFnet ensures that students, lecturers, researchers, and employees have easy and reliable broadband network access to the best possible Information and Communications Technologies (ICT) resources. Therefore, SURFnet must provide the best-in-class network connectivity," says van den Brink, head of network at SURFnet.

SURFnet provides network services to 190 education and research institutions and 1.5 million students, lecturers, and scientists in the Netherlands. For example, connectivity serves high-energy physicists and radio astronomers at research universities who need to analyze massive amounts of data to reveal the secrets of the universe. Connectivity is equally important to students learning to make furniture or practice commercial fishing at the country's vocational schools. "They bring their own devices and expect to be able to use all of them to access their learning environment and (open) learning materials anywhere, anytime, as well as use them to gain insights into their individual learning achievements," says van den Brink.

"We have access to experts at Juniper. If we run into trouble, we get help from the best people Juniper has in the field."

- Ruben van den Brink, Head of Network, SURFnet

Building an Open, Programmable Network

SURFnet8 is designed to be a highly flexible and software-driven network. "All services on the SURFnet8 network will be deployed automatically," says van den Brink.

The SURFnet service layer is built on the Juniper Networks® MX Series 5G Universal Routing Platforms. Segment routing is chosen to signal paths through the MPLS network combined with topology-independent loop-free alternate (TI-LFA). This technology was chosen to secure a stable and fault-tolerant network, one of the key objectives of the new network. Multiple 40 Tbps Juniper Networks MX2008 5G Universal Routing Platforms, a carrier-grade router with ultra-high-density, are used in the core, along with some of the smaller chassis such as the MX960, MX480, and MX240. The MX204 Universal Routing Platform is used at the edge

to connect more than 300 locations. All devices are provider edge (PE) routers without functional hierarchy with the different MX Series models, which simplifies the architecture and the service deployment model (any service anywhere). The service layer runs over a brand-new optical network, with 100 Gbps transport as standard with the ability to support 400 Gbps and wavelength restoration (WSON).

As part of a flexible, software-driven network, SURFnet8 uses the Juniper Networks NorthStar Controller, an SDN controller, to steer traffic via specified paths if the IGP-suggested path is not optimal. The NorthStar Controller provides granular visibility and control over flows in the IP/MPLS network. It also automates the creation of traffic-engineering paths across the network, increasing utilization and enabling a customized, programmable networking experience.

As real-time infrastructure performance monitoring and intent-based analytics could eliminate potential issues and make operations simpler and more effective, SURFnet will also be testing Juniper® AppFormix® to provide end-to-end visibility into the network's physical and virtual environments.

A Foundation of Openness

"We really like Juniper's philosophy, which enables the use of open languages and protocols," says van den Brink. "We believe that one company will not dictate in the modern technology world. Juniper has adapted its business model for a world moving toward software, while keeping in mind the importance of open technology, and that is a key decision factor for us."

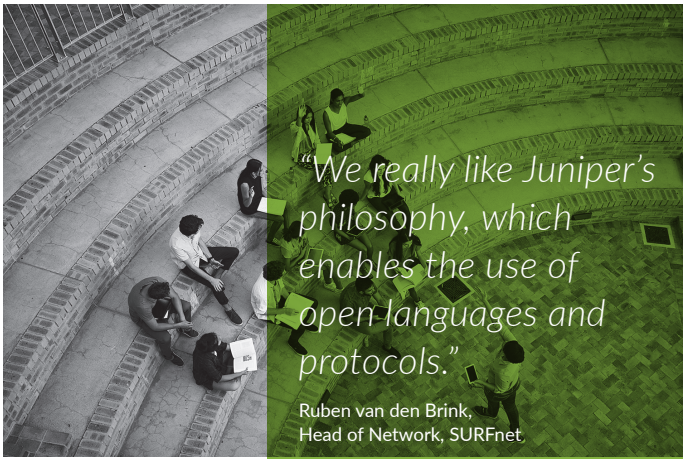
SURFnet created abstraction layers with standardized APIs on top of the administrative and technology domains. The in-house-developed orchestration platform uses standardized interfaces to create service delivery workflows. "We try to keep things as generic as possible, so openness and the use of open protocols is important," he says.

"Once the network is automated, we are going to stitch together services such as storage, computing, and networking as part of one workflow," he adds. Network functions are implemented and distributed across different technology domains, including optical transport, routing, switching, and Network Functions Virtualization (NFV). Resources are automatically optimized based on internal performance metrics. This modularity also enables SURFnet to build out each technology domain independently and at a different pace, allowing for a best-of-breed solution in each domain.

In the automation and orchestration architecture, all network services, including composed services that are offered by different technology domains, can be created, manipulated, and monitored through a network services dashboard and/or API. The SURFnet network operations team has a real-time overview of all services at all times.

The network services dashboard will evolve into a comprehensive self-service portal for fast, on-demand provisioning of all network services, including new services such as virtualized routing or security. For instance, SURFnet is piloting a firewall-as-a-service based on the Juniper Contrail® Platform and Juniper Networks vSRX Virtual Firewall. "Vocational schools are a lot smaller and have less money to spend," van den Brink says. "We can deliver great value to these organizations with a way to assess, detect, and counter threats automatically."

As SURFnet is innovating, it can be confident that it has a strong partner in Juniper. For example, it implemented segment routing in the NorthStar Controller, which allows a router to steer a packet through a specific set of nodes and links on the network. "We have access to experts at Juniper," van den Brink says. "If we run into trouble, we get help from the best people Juniper has in the field."



Orchestration Is a Journey

"My largest benefit from automation and orchestration is not relieving us of manual tasks and lowering costs," he says. "It's about dramatically increasing flexibility and quality."

Self-service lies ahead. "The interaction between network and user will be central to our network: institutions are able to integrate the network optimally with their own applications, and users are able to request (innovative) services, such as virtual firewalls, quickly and easily. They are also able to experiment easily with new technologies."

Van den Brink wants to share SURFnet's automation journey. "We're taking steps that many other R&E networks haven't taken

yet, and people want to hear about the challenges," he says. "It's a tough challenge, and we are making progress." For instance, orchestration requires significant advanced planning, with the details worked out in advance. "Orchestration forces us to rethink all of our processes," says van den Brink. "We have to redefine our services; for example, what is required to deliver a port to a customer, what is a Layer 2 point-to-point service, how should we compose those different parts to create a new service?"

Orchestration also has an impact beyond IT. "Processes like billing and ordering have to fit nicely together with the network services," he says.

Van den Brink has this advice: "If you want to automate your network, start with designing the information flow."

For More Information

To find out more about Juniper Networks products and solutions, please visit www.juniper.net.

About Juniper Networks

Juniper Networks brings simplicity to networking with products, solutions and services that connect the world. Through engineering innovation, we remove the constraints and complexities of networking in the cloud era to solve the toughest challenges our customers and partners face daily. At Juniper Networks, we believe that the network is a resource for sharing knowledge and human advancement that changes the world. We are committed to imagining groundbreaking ways to deliver automated, scalable and secure networks to move at the speed of business.

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