

High-Energy Physicists Collaborate with Ease over Oklahoma Friction Free Network from OneNet and Juniper Networks

Summary

Organization:

OneNet

Industry:

Research and Education Network

Business Challenge:

Enable high-performance computing and offer advanced networking services

Technology Solution:

- MX960, M120, MX480, MX104, and MX80 3D Universal Edge Routers
- SRX3600, SRX240, SRX220, SRX210, and SRX100 Services Gateways
- QFX5100 Switches
- EX4550 and EX4200 Ethernet Switches
- ACX4000 and ACX2000 Universal Access Routers
- Junos Space Network Director
- Resident Engineer

Business Results:

- Built science DMZ to allow physicists to collaborate
- Delivered advanced network services to support education, research, healthcare, and public service communities



OneNet, Oklahoma's statewide network, supports the needs of its education, research, healthcare, and public service agencies. As a technology leader, OneNet offers advanced networking services and keeps its rural communities connected to the world beyond.

Business Challenge

The OneOklahoma Friction Free Network (OFFN) is OneNet's latest innovation. "The primary driving force behind the Oklahoma Friction Free Network is to support research and high-performance computing," says Robert Nordmark, director of network services at OneNet.

OFFN connects researchers across Oklahoma at the University of Oklahoma (OU), Oklahoma State University (OSU), Langston University, and the Tandy Supercomputing Center, which services higher education institutions. OFFN provides access to 200 teraflops of high-performance computing power—200 trillion floating-point operations per second. The users are scientists from the Oklahoma Center for High Energy Physics (OCHEP), a collaboration of researchers from OU, OSU, and Langston who are participating in the ATLAS project, a high-energy physics experiment at the Large Hadron Collider. With 10GbE connections to each site, OFFN enables them to share massive data sets quickly and easily.

"OneNet values our partnership with Juniper. Juniper products and services enable OneNet to achieve our mission of advancing technology across Oklahoma. Juniper plays a key role in ensuring that OneNet can provide the most advanced network in the state. Through 10GbE and 100GbE infrastructures, we advance research and education throughout the state."

Vonley Royal, Executive Director, OneNet

Technology Solution

OneNet is instrumental in the creation and operation of OFFN, an integrated software-defined network and science DMZ built at or near the campus network edge and optimized for high-performance scientific applications. A "friction free" network will allow scientists to conduct research by sending and receiving data without the constraints of a traditional enterprise network.

“OneNet values our partnership with Juniper,” says Vonley Royal, executive director of OneNet. “Juniper products and services enable OneNet to achieve our mission of advancing technology across Oklahoma. Juniper plays a key role in ensuring that OneNet can provide the most advanced network in the state. Through 10GbE and 100GbE infrastructures, we advance research and education throughout the state.”

OneNet uses Juniper solutions extensively in its production network, including SDN-ready Juniper Networks® MX Series 3D Universal Edge Routers for OFFN. MX Series routers provide industry-leading system capacity, density, and performance while supporting sophisticated virtualization capabilities such as virtualized network services, that help streamline network design and operation.

“Juniper’s software-defined capabilities were a major factor in the decision. We can keep OFFN completely separate from the production network,” says Nordmark. “For example, researchers want to manage the high-performance data flows themselves using open-source tools, and SDN gives them the necessary flexibility and visibility into the transport layer.”

In addition to the new OFFN network, OneNet has long offered advanced network services to its users, including a broad array of MPLS services—both Layer 2 VPN and Layer 3 VPN—as well as quality of service and remote router management. OneNet also offers videoconferencing services and hosted course management software for K-20 schools.

The network’s primary data centers are located in Oklahoma City and Tulsa, with multiple hub sites located on the campuses of state universities, colleges, and several career and technology centers. OneNet employs MX960 routers in the core and MX480 routers at the edge, while MX104 routers are used in smaller hub sites.

Juniper Networks QFX5100 Switches and Juniper Networks EX4550 and EX4200 Ethernet Switches are a good fit for OneNet’s highly virtualized data centers. “With the changes in the way services are provisioned, there is more interaction with the virtual platform,” says Nordmark. “Juniper’s switching has been very promising.”

QFX Series switches are high-performance, high-density platforms designed for top-of-rack, end-of-row, and spine-and-leaf aggregation deployments. QFX Series switches can be deployed in multiple data center fabric architectures.

EX4500 Ethernet Switch is a compact, high-performance platform for high-density 10 Gbps data center deployments, while the EX4200 Ethernet Switch is a compact, fixed-configuration switch. Juniper’s Virtual Chassis technology is used to connect multiple EX Series switches as a single, logical device, simplifying network operations. The EX4200 and EX4550 switches are combined in the same Virtual Chassis to support mixed 1GbE and 10GbE environments.

In addition, OneNet uses Junos Space Network Director for comprehensive, automated management of the network. With Network Director, administrators can visualize, analyze, and control the entire enterprise network.

Technology is playing an increasingly central role in K-12 schools, but many Oklahoma school districts are strapped for IT resources and staff. That’s where OneNet’s remote router management service comes in. “If K-12 school districts have a low technology expertise, we can be their partner on the engineering side,” says Nordmark. “We can configure and manage the routers, switches, and firewalls for them.”

The managed service, which provides routing and firewall services, is based on Juniper Networks SRX Series Services Gateways. OneNet uses the SRX3600 Services Gateway in its data centers and SRX240, SRX210, or SRX100 Services Gateways at the customer premises, depending on local requirements.

OneNet also offers high-speed broadband access for underserved areas of the state, giving Oklahoma’s rural communities the same opportunities as those who live in metropolitan areas. OneNet uses Juniper Networks ACX4000 and ACX2000 Universal Access Routers in its hub sites to provide efficient backhaul for these services.

“Junos OS is a great platform for us. We are able to deploy services quicker. Using Juniper not only helps us improve response time, but also the quality of the service.”

Robert Nordmark, Director of Network Services, OneNet

Business Results

Demand for bandwidth is up at OneNet, whether it’s scientists unlocking the mysteries of the universe, kindergartners eager to learn, or public safety and healthcare professionals looking after the well-being of citizens.

“Networking has become a critical service,” says Nordmark. “We’ve seen a big increase in demand for bandwidth from schools and state agencies in the last five years. Cities have applications that are driving increases in bandwidth utilization. Likewise, local tag and driver’s license agencies have a new software application that requires more bandwidth from multiple sources verifying and authorizing Oklahoma drivers.”

OneNet continues to launch new innovative network services to meet its customers’ needs. OneNet recently introduced two services in the summer of 2015—multichassis link aggregation (MC-LAG) and Ethernet VPN (EVPN)—to support data center migration services and disaster recovery services.

Whatever is next, OneNet can be confident that its Juniper network will be an agile, operationally simple infrastructure. Running Juniper Networks Junos® operating system for routing, switching, and security makes the network simple and innovative.

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“The support we receive from Juniper for OneNet and for our region is phenomenal,” says Nordmark. “We have good support and a fast response time when we have an issue.”

Next Steps

Like many research and education networks, OneNet is exploring the possibilities of Network Functions Virtualization (NFV) and SDN not only for the OFFN network, but also to remotely provision network services for its production network. “We’re a middle-mile network,” says Nordmark. “All circuits come back to the closest college or university. By putting the routing and firewall services into the virtual environment, we could offer a flat Layer 2 network to our education customers and make it easier for them.”

For More Information

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

About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at www.juniper.net.

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