

Michigan Tech Relies on Juniper Networks High-Performance Data Center Router for Next-Generation Network

Michigan Tech
Create the Future



Industry: Education

Company:

Michigan Technological University (Michigan Tech)

Challenges:

- Data center router needed to support 10-Gigabit Ethernet as part of the successful rollout of a 100 terabyte network-attached storage/storage area network (NAS/SAN) array
- Support the university's broad range of academic and administrative applications, as well as emerging multimedia applications, with a high-performance, next-generation network infrastructure

Selection Criteria:

Michigan Tech evaluated routers of various capacities from the leading vendors and chose the Juniper Networks MX-, M- and J-series platform based on a winning combination of performance, price, and industry-leading capabilities.

Network Solution:

- Juniper Networks MX960 Ethernet Services Router with a Dense Port Concentrator (DPC) card
- Juniper Networks M10i Multiservice router
- Juniper Networks J6350 and J4350 services routers
- JUNOS software

Results:

- A high-performance and agile infrastructure to support the 100 terabyte storage array and provide users of the university's academic and administrative applications with optimal performance
- Simplified router deployment with consistency across multiple platforms, which led to greater operational efficiency and lower training costs
- Simple and non-disruptive deployment of the data center router

"The learning curve was low because we already knew JUNOS, so there was really nothing new to learn to deploy the new MX960 router in our data center."

Shane Godmere,
Senior Telecommunications Engineer II,
Michigan Tech

Located near the northern tip of Michigan's Upper Peninsula, Michigan Technological University offers its 6,700 students dozens of undergraduate and graduate degree options from such diverse fields as engineering; arts, humanities and social sciences; business and economics; computing; forestry and environmental sciences; and science and technology.

For a university with a large focus on technical fields, it makes perfect sense for Michigan Tech's network infrastructure to be on the cutting edge. To do this, the school relies on the latest innovations and proven solutions. Students, academic and administrative staff expectations are high, and data center applications need reliable connectivity that reach all the way to users' devices.

Challenge

With steady growth in core academic/ administrative applications and data, Michigan Tech found it needed to upgrade its network-attached storage/storage area network (NAS/SAN) from a 35 terabyte solution to a new 100 terabyte storage array. The new NAS/SAN would deliver greater capacity, better performance, and better reliability, but it required 10-Gigabit Ethernet. Michigan Tech's core data center router supported only Gigabit Ethernet.

"They moved in a big monster of a storage system and we needed to hook 10-Gigabit Ethernet into the core router, so we went router shopping," says Shane Godmere, a senior telecommunications engineer at Michigan Tech.

Selection Criteria

Godmere and his team did some investigative work to find the ideal routing solution to handle the performance demands of a large storage array that would support the myriad applications and services that keep the academic and administrative operations at the university humming. Godmere and his team looked at different classes of routers and switches from the leading vendors.

"We looked at routers with a big price tag and switches that did a little bit of routing," Godmere says. "What we needed was a router with good performance at a good price, because we have a limited budget. We dug into the Juniper Networks MX960 and saw that it was exactly what we were looking for."

Solution

Michigan Tech now uses a Juniper Networks MX960 Ethernet Services Router — one of the industry's largest-capacity carrier Ethernet platforms— as the core of its academic/ administrative network. With its 960 Gbps of switching/routing capacity and advanced quality of service (QoS), the MX960 router was a perfect fit, says Godmere.

In addition to the MX960 in the academic/ administrative data center, Michigan Tech relies on other Juniper routers as part of its high-performance infrastructure. A Juniper Networks M10i serves as the core router for Resnet, its residential student network. For a secure connection to Internet and Internet2, Michigan Tech relies on Juniper Networks J6350 and J4350 routers, while Michigan Tech's research institute in Ann Arbor, MI uses the Juniper Networks J4350 router for secure and reliable connectivity.

The Juniper Networks MX960 is ideal for high volume, Internet data center internetworking, which is an excellent solution for customers who need support for a broad range of applications and services, including high-speed transport, VPN services, and next-generation broadband multi-play services. Michigan Tech runs both IPv4 and IPv6 on the network. In addition to a broad range of applications, Michigan Tech also offers voice over IP (VoIP) and video services. Michigan Tech is using IP multicast to deliver IP-based video internally and from the Open Student Television Network (OSTN.TV).

Today, Michigan Tech is using 80 Gbps of the MX960's total capacity, so routing is at wire speed and there is plenty of headroom. The network connects all buildings on campus, including all university residence hall rooms and on-campus apartments, as well as a small number of remote locations. On-campus wireless LAN service is also provided. The network has more than 10,000 hosts and 102 VLANs, 69 of which are public. The private VLANs are used for departments that need confidential access to the shared network as well as for networked alarm circuits, point-of-sale equipment, networked surveillance cameras, and control systems.

Michigan Tech hasn't needed to turn on QoS capabilities yet. But when the university is ready, the MX960 has advanced QoS capabilities that it can use to offer a variety of services including VLAN, Layer 2/Layer 3 VPNs, VoIP and video over IP-over Ethernet.

Deployment of the MX960 router could not have been easier, Godmere says.

"Once we got the box on-site, it was a matter of populating it and getting everything moved over," Godmere says. "Moving the administrative and academic side to the router was a non-event. We copied the current configuration for those subnets, edited the interface names, and then moved the VLANs."

The MX960 router supports high-density interfaces and high-capacity switching throughout. The MX960 provides up to twelve, 40 Gbps slots in a single chassis and supports Juniper Networks Dense Port Concentrator (DPC) cards to allow customers like Michigan Tech to take advantage of unprecedented port density – up to 480-Gigabit Ethernet ports and 48 ports of 10-Gigabit Ethernet per system. The distributed intelligence and packet processing of the MX-series and DPC cards are powered by the I-chip, Juniper's next-generation packet forwarding engine technology. By increasing scalability, packet performance, and enhancing Ethernet-centric quality of service features, the MX-series enables Michigan Tech to increase the number of services and customers supported per platform, without negatively impacting performance. This increases service flexibility and can also drive down capital and operational expenses.

Michigan Tech can be confident that the MX960 is built with the layers of security needed to prevent and mitigate malicious attacks.

The MX960 has protected control plane components and high-performance forwarding to maintain control, despite malicious attack traffic. Scalable firewall filters can apply highly granular access control lists while enforcing rate limits and reducing impact on forwarding performance. This can mitigate the effects of denial of service attacks and block blacklisted IP addresses at the network level.

"The access control lists on the router are very versatile," says Godmere.

Results

In addition to the deployment of an ultra high-performance routing infrastructure, Michigan Tech has benefited in many other ways. Godmere says he really appreciates that Juniper Networks JUNOS™ software runs consistently across their Juniper Networks routers, which translates into ease of use and lower IT training costs.

"When I am managing the routers, everything from the J-series to the M10i and MX960 looks the same from my perspective," Godmere says. "I only have to look at the prompt to see which router I'm on."

Godmere adds that when he first looked at JUNOS software several years ago, he was a bit skeptical but has since found that the logical nature of the software makes it easy to use. Deploying new routers is straightforward, with templates and the ability to cut and paste configurations from one router to another.

"JUNOS is a good network operating system," Godmere says. "The learning curve on the MX960 router was low because we already knew JUNOS, so there was nothing new to learn to deploy the new MX960 router in our data center."

"We have a great working relationship with Juniper," says Godmere. "We can e-mail them questions directly and get answers quickly."

Next Steps and Lessons Learned

With a blissfully boring upgrade of a multi-gigabit data center router, Michigan Tech has more plans in store, including upgrading the edge 10/100 Mbps Ethernet connections and GE uplinks to campus buildings with 10/100/1000 and 10-Gigabit Ethernet uplinks.

For More Information

To find out more about Juniper Networks products and solutions, visit <http://www.juniper.net>.

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About Michigan Tech

Michigan Technological University is a leading public research university, conducting research, developing new technologies, and preparing students to create a future prosperous and sustainable world. Michigan Tech offers more than 120 undergraduate and graduate degree programs in engineering, forestry and environmental sciences, computer sciences, technology, business and economics, natural and physical sciences, arts, humanities and social sciences.

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

