Georgia Utility Jackson EMC Converges Operational Technology and IT Systems with Juniper MPLS Network

Summary

Company:
Jackson Electric Membership Corporation

Industry:
Utilities

Business Challenge:
Build an IP/MPLS network that converges operational technology and information technology systems on the same infrastructure

Technology Solution:
- MX480 3D Universal Edge Router
- SRX300 Services Gateway
- EX4300, EX4200, and EX3300 Ethernet Switches

Business Results:
- Built a flexible, secure, and reliable network that meets the unyielding demands of a power utility
- Enabled smart meter, SCADA systems, and corporate IT systems to share the same infrastructure while maintaining security
- Deployed and managed carrier-grade IP/MPLS network with limited network staff

When Jackson Electric Membership Corporation (EMC) was founded in 1938 to bring power to the homes and farms of rural Northeastern Georgia, membership cost $5. Membership costs the same today, but Jackson EMC has become one of the largest electric cooperatives in the nation. It serves one of the fastest growing areas in Georgia, delivering reliable, energy-efficient, reasonably priced electricity to more than 220,000 business and residential members.[1]

Business Challenge

As a forward-thinking electric utility, Jackson EMC wanted to converge its operational technology (OT) and IT networks to improve visibility into daily operations and to automate control processes that balance energy supply and demand.

Jackson EMC manages outages, geographic information, member information, and supervisory control and data acquisition (SCADA) systems through more than 218,000 smart meters, 79 metering points, and 13,500 miles of energized wire.[2] A dedicated fiber ring connects its engineering and operations center, substations, metering points, and administrative offices.

"A fiber network gives us the opportunity to connect our administrative offices and communicate with substations, tower sites, and meters in the field," says Stewart Williams, network administrator at Jackson EMC.

A key requirement was to maintain separation of operational traffic from SCADA-controlled systems and advanced metering infrastructure (AMI) with corporate applications and data—while sharing the same infrastructure. "We wanted to keep traffic from different systems separate, but still use one set of equipment to connect to the fiber," Williams says.

Williams knew that an IP/MPLS network would ensure isolation while concurrently delivering the capacity, reliability, and security that the electric utility needed. A carrier-class IP/MPLS solution set was essential, but ease of configuration and management was a top priority. "The Number 1 business driver was that we had to be able to support the solution ourselves, and wouldn't need to rely on outside consultants," he says.

Technology Solution

Williams evaluated carrier-class routers from the two leading vendors, and, after becoming familiar with Juniper Networks® Junos® operating system, which powers Juniper's portfolio of routing, switching, and security products, "the decision was easy. We could set up the Juniper network ourselves and configure it with limited staff."

Jackson EMC deployed the SDN-ready Juniper Networks MX480 3D Universal Edge Router for its fiber-based IP/MPLS network. A compact modular platform, the MX480 router delivers high performance, reliability, and scale, and supports a comprehensive set of VPN services. Ultimately, Jackson EMC is using Layer 3 VPNs to ensure traffic separation between OT and IT systems, including SCADA, AMI, and corporate data and applications. Virtual private LAN service (VPLS), a Layer 2 Ethernet virtual private network (VPN) service supporting any-to-any connectivity over IP/MPLS networks, supports the voice communication system used by Jackson EMC's trucks in the field.

 "With Juniper, we are confident that traffic from our different systems is separate and that the network is reliable," Williams says.

The Juniper Networks SRX300 line of services gateways provides routing, switching, and WAN connectivity to connect select rural sites. As Williams explains, "We run the same code on the SRX Series gateways in those far-flung sites that we do on the MX480 routers in the central part of the system. We can extend any service or network to the far corners of our network using the same setup we have anywhere else. That makes it a lot easier when I have to make changes or additions."

Jackson EMC also uses Juniper Networks EX Series Ethernet Switches for the corporate network, including EX4300, EX4200, and EX3300 Ethernet Switches, which run the same Junos OS as the SRX Series gateways and MX Series routers. Juniper's Virtual Chassis technology is used to connect EX4200 switches across multiple buildings at the company headquarters, simplifying operations and enabling easy scalability.

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Business Results

Using Juniper's proven solutions for the energy industry, Jackson EMC built a flexible, secure, and reliable network that meets the unyielding demands of a power utility. Having high-quality, reliable power attracted commercial and industrial businesses in the region, contributing to economic growth. Jackson EMC's commitment to service excellence is evident from the high member satisfaction ratings the cooperative consistently receives. In fact, in 2016, Jackson EMC was rated #2 in the J.D. Power 2016 Electric Utility Residential Customer Satisfaction Study for cooperatives.[3] Having a reliable network improves operational efficiency and helps the company return more profits to its members.

By building a better IP/MPLS network with Juniper, Jackson EMC can keep its operational traffic—including SCADA systems and smart meters, as well as corporate IT systems—flowing swiftly, reliably, and securely on a shared infrastructure. "Our Juniper network is critical to communicate with our substation devices, between our offices, and to ensure that automated metering runs," Williams says. "The network is invisible—the way it's supposed to be."

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The move to a carrier-class IP/MPLS network was easier than anticipated, even with limited IT staff. "At first, building a service-provider-quality MPLS network seems intimidating," Williams says. "It's different, but it's not as difficult as you might think."

"With Juniper, changing or adding new services and systems is easy, because we don't have to redesign the core of the network. We simply can make a change on the endpoint where we need the network service to appear."

Using Junos OS network-wide also reduces the time and effort it takes to plan, deploy, and operate the network infrastructure. A single release train provides stable delivery of new functionality in a steady cadence. "It's so much easier to keep up with one command line and one configuration base with Junos OS," Williams says.

Next Steps

Jackson EMC is continuing to advance its network infrastructure. It plans to migrate to an open, flexible, scalable fabric for its data center core that will reduce network complexity and operational expanses by enabling distributed devices to be managed as a single, logical device.

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[3] http://www.jdpower.com/press-releases/jd-power-2016-electric-utility-residential-customer-satisfaction-study

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