Power Utility: Transforming the Economics of Networking

Juniper partners with power companies to reduce costs, improve security, and decrease network governance complexity while achieving 99.999% reliability for critical applications

Challenge

Power company legacy networks aren't able to support the communications requirements of emerging grid management applications. Current architectures lack the flexibility, management visibility, and intelligence to provide solutions without adding staff and legacy componentry.

Solution

Juniper Networks provides a service provider blueprint for power utility networks to move packets with high speed and reliability while providing cybersecurity at the packet level, arresting attacks early in the "kill chain" and protecting mission critical assets.

Benefits

- Lower operating costs through automated provisioning and governance workflows
- Improved cybersecurity with centralized monitoring
- Automation-policy control and implementation
- Seamless data center aggregation

Emerging power grid dynamics such as distributed energy resources (DERs), smart grid initiatives, and delivery of new services are having a profound effect on the way power utility provider networks operate. These dynamics will require a transformation to a high availability, service provider quality interconnect between energy producers, distribution and transport grids, consumers, and ISOs—modernizing the network to help companies reduce costs, increase security, and improve agility.

The Challenge

Power utilities face a number of challenges today. These include seamlessly employing multiple energy sources and improving the "intelligence" of the transmission systems to maximize efficiency and avoid delivery failures. Power utilities must also accommodate new technologies, including smart meters, grid sensors, and mobile applications. In addition, increasingly sophisticated cyberthreats to critical power grid infrastructures are intensifying with IP packet network adoption. Addressing these challenges demands a modernization strategy that also transforms the economics of networking.

The Juniper Networks Power Utility Solution

Juniper Networks partners with a number of power utility companies to transform networks, not only to help them meet today's challenges but also to support future requirements by addressing common management goals. These include:

- Reducing operational expenditures and simplifying governance complexity
- Achieving 99.999% uptime for core and critical applications
- Enabling the transition, deployment, and automation of new and existing services

Juniper Networks® MetaFabric™ architecture provides the holistic blueprint for building intelligent networks in the data center, network operations center (NOC), campus and branch, and field area networks. It is a secure, scalable, and automatable underlying networking platform for next-generation applications like automated meter infrastructure, demand response, distributed control systems, big data analytics, high-performance computing, and other mission-critical applications. This blueprint provides a flexible foundation to include "as needed" SDN, network automation and control, and virtual functionality to optimize economic transformation.

Features and Benefits

- A modernized architecture that supports diverse technologies and operational functions with a single, converged network that is inherently protocol-independent, highly reliable, secure, and provides design flexibility to extend IP/MPLS natively from the core to the field area network
- Ethernet virtual private networks (EVPNs) over MPLS that seamlessly aggregate multiple data center sites and NOCs

- A robust MPLS core to support existing industrial control communications and enable a centralized, carrier-class cybersecurity strategy at the data center and network operations center to reduce governance complexity, while enabling zero touch provisioning (ZTP) capability at the network edge

- Flexible inter-substation communications for mission-critical applications such as Teleprotection over Carrier Ethernet or MPLS

- A fully integrated system that can be automated to commission, test, and validate new data centers, and ease moves, adds, and changes through a web-based, one-touch dashboard

Solution Components

Converged Core: Service provider-grade, IP/MPLS core network to transport business and mission-critical traffic reliably over a single converged infrastructure—the foundation for a successful transformation to a single, ubiquitous network.

Data Center Aggregation: NOCs and data centers represent centers of excellence that require intelligent networks to support smart grid implementations such as automated meter infrastructure, demand response, distributed control systems, big data analytics, high-performance computing, and other mission-critical applications. EVPN delivers a wide range of benefits for geographically dispersed centers of excellence—including greater network efficiency, reliability, scalability, VM mobility, and policy control—that directly impact the bottom line of power utility providers.

Cybersecurity: Integration of geographically distributed assets through centralized control that improves agility when responding to supply and demand fluctuations, reduces operational costs, and enables previously unachievable process efficiencies. A systematic approach to security begins by reducing the vulnerable surface of the industrial control system network. Carrier-class systems include redundant hardware, in-service software upgrades, line-rate performance, and wire-speed security.

Substation Control and Monitoring: Circuit-to-packet emulation over service provider-grade MPLS preserves the inherent security of serial time-division multiplexing (TDM) communications common to industrial networks, while supporting a centralized cybersecurity strategy and a paced migration of industrial control systems to IP. Each supervisory control and data acquisition (SCADA) device transmit or receive signal can be copied to many different locations and alarms, and control information can be sent to multiple sites. Video surveillance can also be directed to multiple sites, saving bandwidth by copying packets closer to the destination.

Field Area Network Service Extension: Juniper Networks ACX Series Universal Access Routers provide the necessary service aggregation and extension to power utility customers. Additionally, substation compliant ACX Series platforms offer zero touch provisioning (ZTP) to reduce deployment and operational costs. These extended services include smart metering systems, enhanced Internet, and IPTV.

Network Automation: Juniper Networks Junos® operating system software automation features, developed over the past 15 years, enable Juniper to deliver new features and more than 37,000 XML Remote Procedure Calls in core Junos OS and Network Configuration Protocol (NETCONF) to provide network-based system access. Juniper has identified approximately 24 of the most common network tasks that can be automated.

Summary—Juniper Solutions are Transforming Today's Power Utility Network Modernization Challenges and Addressing Future Requirements

Power company legacy networks are no longer able to support the communications requirements of emerging grid management applications. However, their near term and future requirements could be met by a single, ubiquitous network that is agile, automated, application independent, aggregated for improved cybersecurity, and engineered for centralized visibility and control.

Juniper understands the networking requirements of the power generation and distribution industry, and it collaborates closely with customers to optimize the value its proven products and integrated solutions bring to the utility market through the MetaFabric architecture. With a mandate to reduce operating costs, improve agility, and ensure reliability, Juniper and its partners are committed to meeting the evolving needs of the dynamic power utility landscape.

Next Steps

For additional information on how Juniper Networks can support your power utility network modernization initiatives or learn more about the technology, please contact your local Juniper sales representative or visit http://www.juniper.net/us/en/solutions/.

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at Juniper Networks or connect with Juniper on Twitter and Facebook.

Corporate and Sales Headquarters

Juniper Networks, Inc.

1133 Innovation Way

Sunnyvale, CA 94089 USA

Phone: 888.JUNIPER (888.586.4737)

or +1.408.745.2000

Fax: +1.408.745.2100

www.juniper.net

APAC and EMEA Headquarters

Juniper Networks International B.V.

Boeing Avenue 240

1119 PZ Schiphol-Rijk

Amsterdam, The Netherlands

Phone: +31.0.207.125.700

Fax: +31.0.207.125.701

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