ACCELERATE GRID MODERNIZATION WITH ASSURED RELIABILITY AND CYBERSECURITY

Juniper brings 99.999% network uptime for critical applications, strong security, and automated operations for utility networks.

Challenge
The business case for modernizing the grid is compelling, as utilities can converge operational technology (OT) and information technology (IT) networks to streamline operations and reduce costs.

Solution
Juniper's portfolio of routing, switching, security, and network automation can enable power utilities to transform their networks, achieving 99.999% uptime for core and critical applications, reducing operational expenditures, and enabling next-generation edge applications.

Benefits
- *Support the most demanding control and protection applications like teleprotection*
- *Deliver applications and services where and when needed*
- *Keep pace with today's threat landscape*
- *Deploy resilient, repeatable automation of common network tasks*
- *Adopt next-generation asset management and indoor location services*

Threats to critical infrastructure and the impact of climate change are putting new pressures on power utilities. New technologies, such as rooftop solar panels, energy storage, electric vehicles, and advanced metering infrastructure, promise a more efficient, reliable, and resilient energy future.

Yet much of the nation's network of electricity generation, transmission, and distribution resources is aging. The business case for modernizing communications networks is compelling, as utilities can converge operational technology (OT) and information technology (IT) networks, re-imagine the grid edge, streamline network operations, and reduce costs.

As utilities consider the best path forward to modernize their communications infrastructure to support a smart and active grid, Juniper's portfolio of resilient networking, connected security, and network automation ensures that safety and reliability are never compromised.

The Challenge

A changing energy mix, unprecedented cyberattacks, and climate change are creating greater challenges for power utilities.

Distributed energy resources (DERs), smart grid initiatives, and the delivery of new services have a profound impact on how utility provider networks operate. These power grid dynamics require a modern, service-provider quality interconnection between energy producers, distribution, and transport grids, consumers, and independent system operators (ISOs) to enable utilities to reduce costs, increase cybersecurity, and improve agility.

Unprecedented cyberattacks are threatening the operations of critical infrastructure, and the risk of financial, environmental, and infrastructure damage is growing as industrial control systems allow remote access and connect to business networks. The federal government has specifically identified the grid's destruction systems as vulnerable, calling for immediate action. Cybersecurity cannot be an afterthought. Utilities need threat-aware networks that mitigate cybersecurity risks.

Utilities are especially impacted by climate change. The frequency of extreme weather events is increasing service outages and driving up financial risk. Utilities are proactively strengthening their network and operations, creating a smart and active grid, to maintain power during severe weather and quickly restore service after failures.

Broadband services offer an opportunity for utilities to diversify their service portfolio and deliver more services to customers. Rural electric cooperatives have been offering Internet services to consumers and businesses for many years, and electric utilities of all types can leverage their existing infrastructure investments to generate additional revenue.

A network modernization strategy can allow utilities to efficiently deliver a critical service and expand revenue opportunities while minimizing the risks of a changing energy mix, cyberattacks, and climate change. Utilities can employ multiple energy sources and improve the intelligence of transmission systems to maximize efficiency and avoid delivery failures. Modernization brings increased flexibility while reducing operational costs.

The Juniper Networks Power Utilities Network Solution

Juniper partners with power utilities to modernize and transform their networks to meet today's challenges and future requirements by addressing common management goals, such as:

- Achieve 99.999% uptime for core and critical applications
- Reduce operational expenditures and simplify governance
- Enable the transition, deployment, and automation of next-generation edge applications

With a reliable, scalable, service-provider quality network infrastructure from Juniper, utilities have a strong foundation for automated meter infrastructure (AMI), demand response, distributed control systems, analytics, industrial IoT, AI and advanced analytics, and high-performance computing.

With Juniper, utilities can take advantage of a flexible building-block approach for core, data center, network operations center, campus, branch, and field area networks. With an open, programmable Juniper network, utilities can choose best-in-class solutions and avoid vendor lock-in. And utilities can migrate at their own pace, without rip-and-replace.

Features and Benefits

Utilities put their trust in Juniper networking, security, and network automation to modernize their networks.

Support the Industry's Most Demanding Control and Protection Applications like Teleprotection

With Juniper, utilities can build a private, on-premises multivendor network that delivers the highest levels of reliability and resiliency, supports next-generation services, and drives operational efficiency. Gaining centralized control over distributed assets improves agility when responding to supply and demand fluctuations and enables the deployment of new processes. Operational and business traffic can securely share the same physical network, driving further efficiencies and simplifying network operations.

Utilities can rely on Juniper to support SCADA, teleprotection, engineering access, legacy protection schemes, and circuit-to-packet communications. Juniper's networks support the class-of-service, timing, and synchronization requirements necessary for the most demanding deterministic applications requiring millisecond resolution.

By extending the IP/MPLS network from the core to the substation and field-area networks, utilities can simplify delivery of the next generation of applications. Each 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, preserving bandwidth.

With a Juniper network, utilities can also efficiently deliver smart metering services, high-speed Internet, voice and video to residential customers, as well as enterprise-grade network services to businesses.

Deliver Applications and Services Where and When Needed

Smart meters, demand response, distributed control systems, and other smart grid applications require fast, intelligent networks. With a Juniper IP fabric as the foundation of the data center, utilities can increase deployment flexibility and deliver applications and services where and when they are needed.

A data center fabric effectively flattens the network architecture, resulting in greater efficiency, lower latency, and increased scalability. A Juniper data center fabric provides a solid layer of connectivity in the physical network, enabling network virtualization, stretched Ethernet segments, and virtual machine workload mobility across multiple data center sites and network operations centers (NOCs).

Keep Pace with Today's Threat Landscape

With Juniper's approach to zero-trust security, utilities can enhance situational awareness and mitigate business risk.

Juniper Connected Security safeguards utilities against rising cyber risk by unifying all network elements into a threat-aware network. Juniper's built-in defenses automatically protect users, devices, applications, and data across systems. Security policies are dynamically enforced at every point of connection.

With Juniper, critical applications operate safely, while even fast-moving attacks are detected and blocked. With clear visibility into threats and centralized, automated control over access and enforcement, utilities are protected from end to end and from top to bottom.

Deploy Resilient, Repeatable Automation of Common Network Tasks

With a fully converged network from Juniper, utilities can simplify the deployment, management, and changing of core, data center, office, and field-area networks.

Juniper's network automation tools enable IT to drive intent-based operations across the network and services life cycle, reducing the time to perform common operating tasks and minimizing process-related errors. Automation can speed repetitive processes, connecting the user intent such as creating a SCADA circuit, with the necessary configuration steps. The setup of an advanced data center fabric, including an Ethernet VPN-Virtual Extensible LAN (EVPN-VXLAN) architecture for workload mobility and scalability, can be automated, and the service continuously assured.

Network automation empowers the IT team to do more with the resources they have while engaging in more satisfying work.

Adopt Next-Generation Asset Management and Indoor Location Services

From offices to the field, workers expect their mobile devices to connect quickly, easily, and securely. With Juniper's AI-driven enterprise network solution, utilities can deliver a superior network user experience and streamline IT operations.

For utilities that want to keep tabs on high-value assets like parts, tools, or supplies, there's no need to deploy an overlay network for real-time location services. With Juniper, utilities can leverage a single wireless infrastructure for both Wi-Fi connectivity and asset tracking, which simplifies deployment and lowers cost.

Solution Components

Solution Domain	Summary	Description
Converged Core Network		
Juniper Networks® MX Series Universal Routing Platforms	Build a service-provider grade network to converge OT and IT operations.	Utilities can leverage MX Series routers to build a private IP/MPLS network that supports both operational technology and business systems.
		MX Series routers provide industry-leading system capacity, density, security, and performance with unparalleled longevity.
		MX Series routers simplify connectivity from the core network to the edge.
		The Juniper Networks vMX Virtual Router brings the same feature set and operations as the physical MX Series routers to a virtualized solution.
Juniper® Session Smart™ Router	Deliver agility, security, and resilient connectivity that optimizes the network user experience in offices and field locations.	The Session Smart Router takes software-defined routing and SD-WAN to the next level. It creates a flexible, application-aware network fabric that meets stringent enterprise, performance, security, and availability requirements.
		A tunnel-less architecture enables up to 75% reduction in headend infrastructure costs and 30% to 50% reduction in bandwidth costs.
		The software-based Session Smart Router can be deployed on white-box CPE, data center servers, and in the cloud.
Connected Substations		
Juniper Networks ACX Series Universal Metro Routers	Provide fast, secure network aggregation and access for substations and field locations.	Substation-compliant ACX Series platforms simplify network architectures and dramatically reduce costs by eliminating network overviews.
		ACX Series routers can enable Ethernet or IP/MPLS infrastructure and are optimized to deliver high precision synchronization, industry-leading security, and high availability features ideal for utilities.
		Environmental- or temperature-hardened designs and low power consumption enable deployment in extreme situations such as outside cabinets or remote points of presence.
Joint SEL-Juniper solution	Automate critical utility applications and enable secure and seamless IT-OT convergence.	The substation-hardened and reliable SEL-2740S Software Defined Switch, SEL-5056 Software-Defined Network Flow Controller, and SEL ICON Integrated Communications Optimal Network integrate with MX Series routers to support circuit orchestration and network monitoring.

Solution Domain	Summary	Description
Data Center		
Juniper Networks QFX Series Switches and EX Series Ethernet Switches	Optimize applications and services with cloud-grade, high-density Ethernet switching.	Juniper switches provide the high-performance, high-density platforms required to build data center fabrics to support next-generation grid applications.
		QFX Series switches deliver industry-leading throughput and scalability, the best routing stack, the open programmability of the Junos® operating system, and the broadest set of EVPN-VXLAN and IP fabric capabilities. QFX Series switches are ideal for data center spine-and-leaf switches, campus distribution, and core network.
		EX Series Ethernet Switches are ideal for AI-driven access switching that delivers superior user and device experiences while simplifying operations with zero-touch provisioning and AI-driven insights and automation.
Grid Cybersecurity		
Juniper Next-Generation Firewall	Protect the network edge, data center, and cloud applications with next-generation physical, virtual, and containerized firewalls.	Juniper Networks SRX Series Services Gateways reduce the risk of attack and provide granular control of applications, users, and devices through identity-based policies, microsegmentation, VPN connectivity, and validated threat prevention.
		The Juniper Networks vSRX Virtual Firewall provides flexibility, effectiveness, and performance for cloud environments.
		The highly agile Juniper Networks cSRX Container Firewall offers advanced security services to improve the visibility and secure applications running containers and microservices.
Juniper Advanced Threat Prevention	Find and block both known and unknown cyberthreats.	Juniper Advanced Threat Prevention is a threat intelligence hub for the network, with built-in services that use AI to detect attacks and optimize enforcements.
		The Juniper ATP Cloud service finds and blocks commodity and zero-day cyberthreats within files, IP traffic, and Domain Name System (DNS) requests.
		The service assesses risk from encrypted and decrypted network traffic and connected devices, including IoT. It also distributes intelligence throughout the network to stop attacks and drastically reduce the attack surface before a breach occurs.
Automation and Network Management		
Juniper Apstra	Bring continuous automation and assurance to data center operations.	Apstra enables you to automate the data center network life cycle in a single system.
		Apstra is a revolutionary approach. Start by specifying the outcomes you want, and the software will set up the network, ensure it runs as intended, alert you when brownouts or deviations occur, and manage changes and maintenance.
		The Apstra toolset automates the design, deployment, and management of EVPN-VXLAN and IP fabrics. This reduces the time from design to deployment from months or weeks to days or even hours.
Juniper Paragon™ Automation Portfolio	Use closed-loop automation to translate business intent into service performance.	Juniper Paragon Planner (formerly NorthStar Controller) is a network planning and simulation tool used to optimize network usage without impacting network performance.
		Juniper Paragon Pathfinder simplifies and automates provisioning, management, and monitoring of IP/MPLS networks and segment routing
Wireless Access and Asset Tracking		
Juniper AI-Driven Enterprise portfolio	Deliver optimized network user experiences and simplify network operations for offices and field locations.	Juniper's microservices cloud architecture natively integrates AI and data science tools to create a scalable, agile, and reliable wireless solution for corporate headquarters, offices, and field locations.
		Juniper delivers exceptional user, device, and IoT experiences with customizable service-level expectations (SLEs) based on streaming telemetry data from the Juniper Series of High-Performance Access Points. An integrated AI engine with self-driving capabilities proactively resolves issues before users even notice they have occurred.
Juniper Mist™ Asset Visibility	Locate assets and support proximity tracing with ease and accuracy.	Juniper Mist Asset Visibility cloud service makes it easy to find high-value assets and people with detailed location analytics.
Services		
Juniper Global Services	Choose from advisory, implementation, migration, optimization, and support services.	Juniper Global Services is here to help you achieve success in your network modernization strategy and reach your business goals.

Summary—A Reliable, Secure Foundation for Efficient Service Delivery and Next-Gen Grid Applications

As pressure mounts on budgets and business cases for modernizing the grid edge, power utilities can rely on Juniper's comprehensive portfolio of resilient routing, switching, security, and network automation to ensure that safety and reliability are never compromised.

With Juniper, utilities can build a modern foundation for teleprotection as well as emerging smart grid applications. A Juniper network is threat-aware, following a zero-trust security approach, and it provides active response to fast-moving threats. Juniper enables power utilities to transform their networks, achieving 99.999% uptime for core and critical applications, accelerating grid modernization, reducing operational expenditures, and enabling next-generation edge applications.

Next Steps

For more information, please visit **Juniper's Utilities Solutions** or contact your Juniper Networks representative.

About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.

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