NEXT-GENERATION RETAIL NETWORKS ACCELERATE DIGITAL TRANSFORMATION

Overview

Forward-looking retailers are continuously seeking innovative ways to improve business performance and maintain a competitive edge in today's global economy. Many are fusing in-store and online technologies, using data analytics, machine learning (ML), and artificial intelligence (AI) to reinvent the customer experience and streamline business processes. In-store location beacons, smart sensors, and surveillance cameras can provide valuable insights into consumer behavior. And digital signage and interactive mobile apps can entice shoppers and transform customer engagements.

By delivering rich, omnichannel shopping experiences that blend physical and digital interactions, providing the right information at the right point in the buyer journey, retailers can increase online and foot traffic, boosting conversion rates and upsell opportunities. And by optimizing operations and merchandising, retailers can increase workforce productivity, improve inventory management, and reduce expenses.

Digital Retail Applications

- **Collaborative Retail Ecosystem with Process Automation—**Use AI and ML to streamline workflows and optimize operations
- **Value Driven Consumption for Immersive Experiences—**Use digital signage, smart shopping carts, and interactive mobile apps to engage consumers
- **Consumer enablement through Omnichannel Retailing—**Blend in-store, online, and social interactions to improve customer loyalty
- **Merchandise Optimization with Intelligent Merchandizing—**Use beacons and sensors to analyze shopper patterns and optimize store layouts
- **Consumer Autonomy with Kiosks—**Introduce self-serve terminals with bots and live sales and support specialists

The Challenge: Ensuring Fast, Reliable, and Secure Connectivity

Digital retail applications fundamentally reshape network traffic flows, introducing performance, security, and service quality challenges for system architects Historically, most retailers hosted applications in central data centers or colocation centers. They connected retail sites over MPLS networks or private WANs, over which they had deep visibility and tight control.

In the new model, retail applications and services are hosted in public and private clouds (as well as in data centers). And high volumes of business-critical application traffic flows over best-effort public Internet connections over which the retailer has little visibility and control.
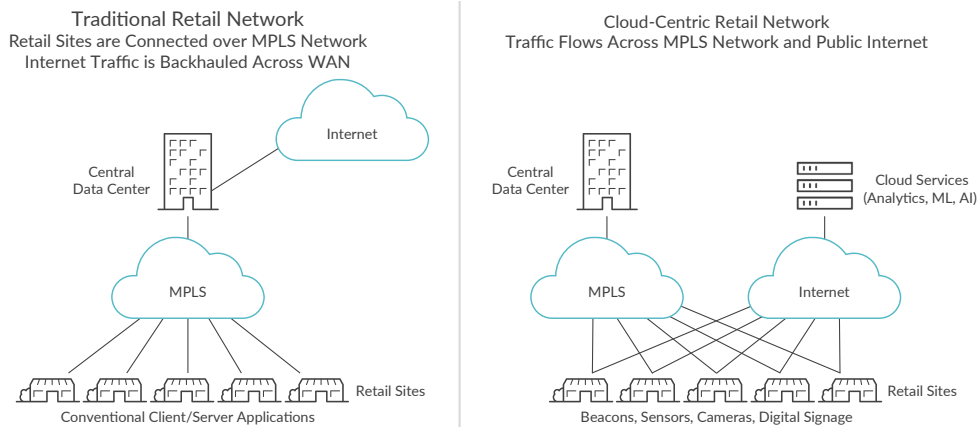
Traditional Retail Network
Retail Sites are Connected over MPLS Network
Internet Traffic is Backhauled Across WAN

Cloud-Centric Retail Network
Traffic Flows Across MPLS Network and Public Internet

Figure 1: Traditional vs. cloud-centric retail network

Traditional retail store networks, designed to support conventional business applications and IT services, aren't well suited for the digital era. Retailers must re-architect their networks to meet the increased performance, agility, and resiliency demands of a cloud-first world.

Juniper AI-driven SD-WAN Solution

The Juniper AI-driven SD-WAN solution, powered by the Juniper Session Smart Router, is an advanced, service-centric networking solution that takes the software-defined WAN to a whole new level. Ideal for next-generation retail networks, the solution provides fast, secure, and reliable WAN connectivity with unmatched simplicity and economics.

The AI-driven SD-WAN solution eliminates the inherent inefficiencies and cost constraints of traditional branch office networking products and legacy SD-WAN solutions, as it meets stringent next-generation retail network requirements:

- **Economics—**A fully software-based solution, AI-driven SD-WAN runs on commercial off-the-shelf servers or Juniper SSR Series Router appliances for ultimate economics and choice. Unlike with a traditional service function chaining approach, the AI-driven SD-WAN solution performs multiple logical network functions (router, stateful firewall, WAN optimizer, etc.) in a single virtualized network function (VNF), significantly reducing CPU and memory requirements. Secure Vector Routing (SVR) and lossless application delivery expand bandwidth capacity by as much as 50%. And native analytics obviate the need for external network monitoring and analysis solutions.
Scalability—The solution supports up to triple the number of routers per head-end and delivers up to four times the hardware performance of alternative solutions. Zero-touch provisioning (ZTP) enables plug-and-play installation at

remote sites, allowing retailers to turn up hundreds of locations per week.

- **Security—**Its pioneering SVR approach provides strong data security without the overhead of traditional encryption protocols. Deny-all (zero trust) routing, L3/L4 denial of service/distributed DoS (DoS/DDoS) protection, payload encryption, URL filtering, and Network Address Translation (NAT) and VPN functionality all work together to protect applications and infrastructure against data loss and malicious attacks.

- **Availability—**AI-driven SD-WAN provides continuous connectivity without requiring expensive hot-standby tunnels like conventional branch office networking or legacy SD-WAN solutions. In the event of a link failure or ISP outage, the solution seamlessly redirects traffic over an alternative path without disrupting sessions or impairing application performance.

- **Visibility—**Unlike alternative solutions that encapsulate all data flows into a single overlay tunnel, the AI-driven SD-WAN's tunnel-free architecture gives network administrators full visibility into individual data flows, so they can efficiently monitor end-to-end sessions, track key performance indicators (KPIs), and troubleshoot problems. Single-pane-of-glass, centralized management simplifies ongoing administration and operations at unstaffed retail locations and makes it easy to institute uniform policies across clouds.

- **Performance—**The solution supports a variety of WAN optimization features, traffic steering, quality-of-service (QoS) functions, and session-aware routing capabilities, along with a tunnel-free architecture to ensure high performance and service quality for diverse applications and services.

Juniper Mist WAN Assurance

Juniper Mist WAN Assurance is a cloud service that brings AI-powered automation and service levels to the Juniper AI-driven SD-WAN solution. Driven by the power of Mist AI, WAN Assurance simplifies day two operations with insights, proactive anomaly detection and remediation, and automated troubleshooting. The resultant AIOps allows administrators to understand and improve their users' experience across the SD-WAN

With Juniper Mist WAN Assurance:

- Session Smart Routers, deployed as SD-WAN edge devices, provide rich streaming telemetry needed for WAN health metrics and anomaly detection.

- Insights derived from telemetry data allows WAN Assurance to compute unique "user minutes" that indicate whether users are having a good experience.

- This data is leveraged within the Mist Cloud AI engine, driving simpler operations, reducing mean time to repair (MTTR), and providing better visibility into end-user experiences.

- The Marvis virtual network assistant for WAN allows administrators to ask direct questions such as, "Why is my Zoom call tiling?" or "Why can these users not connect to Teams?" Marvis provides complete insights, correlation, and actions.

- Marvis actions may include corrections for issues such as application latency conditions, congested WAN circuits or negotiation mismatch, or problems with a host device.

For an example of WAN Assurance in action, see this short explainer video.

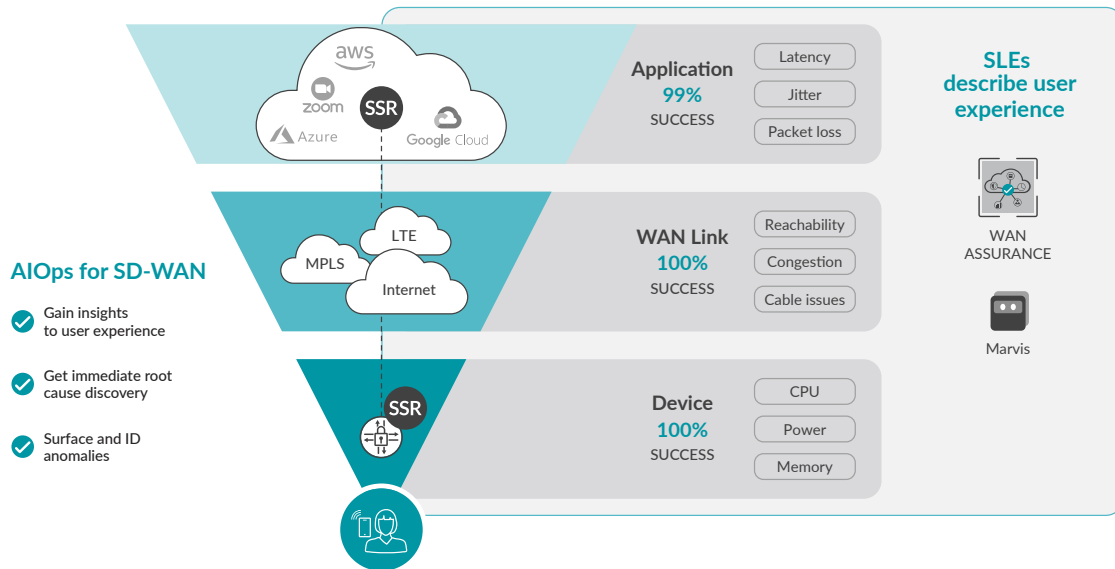*Figure 2: WAN Assurance Delivers Service Level Experiences for Users*

AI-driven SD-WAN Eliminates Retail Network Cost and Complexity

Table 1: Traditional/Legacy SD-WAN vs. AI-driven SD-WAN Capabilities

Requirement	Traditional WAN and Legacy SD-WAN	Juniper AI-driven SD-WAN
Simple, low-cost platform	Discrete branch office networking and security middleboxes add cost and overhead. Legacy SD-WANs require expensive servers to support multiple dedicated VNFs.	AI-driven SD-WAN consolidates all network functions onto a single VNF that can run on inexpensive commercial off-the-shelf (COTS) servers or Juniper SSR Series appliances. Plug-and-play installation streamlines rollouts.
Strong security	Tunnel overlays safeguard data privacy, but limit visibility and control, and impair performance.	Secure Vector Routing protects data privacy, while enabling granular traffic management and visibility.
Application- specific service assurances	Tunnel overlays inhibit traffic management and prevent application-specific SLAs.	Fine-grained traffic management and application-aware routing enable application-specific, policy-based SLAs.
Continuous connectivity	Idle hot-standby tunnels are costly and inefficient.	Multipath session migration provides cost-effective protection against link failures and ISP outages. Server load balancing provides business continuity and disaster recovery (BC/DR) for critical applications.
Optimal performance over low-speed links	High-overhead tunneling protocols squander bandwidth and impair the performance of delay-sensitive applications.	Secure Vector Routing minimizes protocol overhead. Lossless application delivery optimizes bandwidth utilization and boosts application performance.
Visibility	Tunnel overlays inhibit visibility and control.	Tunnel-free architecture provides visibility into individual data flows, enabling end-to-end session monitoring and troubleshooting. Mist WAN Assurance provides actionable insights into root cause issues impacting user experience.

Major U.S. Pharmacy Chain Reduces Network Cost and Complexity

A leading U.S. pharmacy and healthcare company is using AI-driven SD-WAN to modernize its vast retail data network. (The company also leverages Juniper for wired and wireless). The solution replaces an expensive and complicated legacy network, providing agile, secure, and reliable connectivity to thousands of stores, over low-cost broadband Internet services.

- Extensive packet shaping and prioritization capabilities ensure high service quality for delay-sensitive data flows like unified communications (UC) and telemedicine traffic.

- Policy-based access controls and strong security capabilities protect retail site and data center IT infrastructure against cyber-attacks and data breaches.

- Seamless 4G failover support ensures continuous availability for business-critical applications.
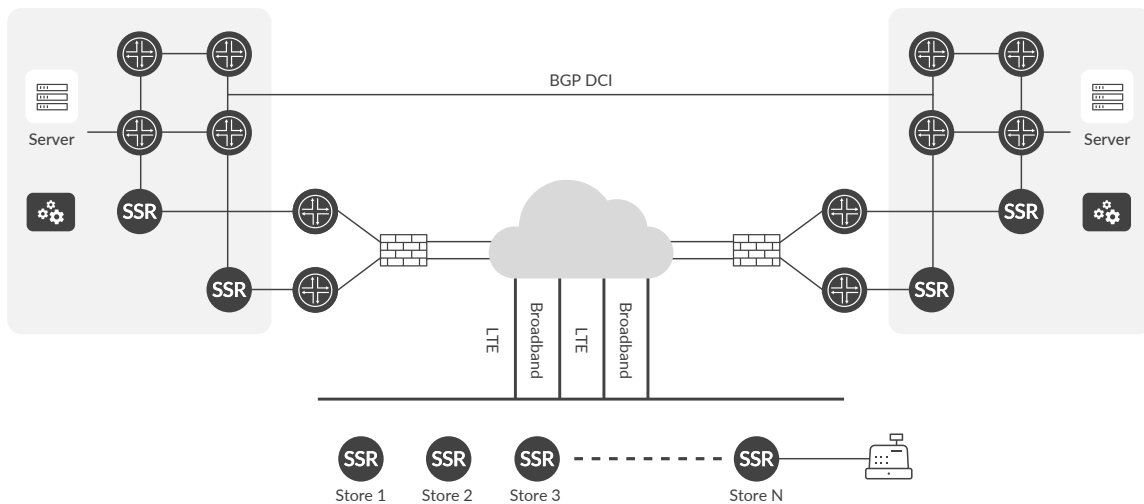

Figure 3: AI-driven SD-WAN for next-generation retail store

The Juniper AI-driven SD-WAN solution is saving this U.S. pharmacy chain around $30 million in network infrastructure costs alone.

For More Information

To find out more about how the AI-driven SD-WAN solution might transform your retail network, please contact your Juniper account manager and visit https://www.juniper.net/us/en/solutions/sd-wan.html.

About Juniper Networks

Juniper Networks brings simplicity to networking with products, solutions and services that connect the world. Through engineering innovation, we remove the constraints and complexities of networking in the cloud era to solve the toughest challenges our customers and partners face daily. At Juniper Networks, we believe that the network is a resource for sharing knowledge and human advancement that changes the world. We are committed to imagining groundbreaking ways to deliver automated, scalable and secure networks to move at the speed of business.

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