JUNIPER NETWORKS | Driven by Experience™

CREATING THE STORE OF THE FUTURE WITH AI-DRIVEN SD-WAN

Blend digital and physical to provide unparalleled in-store experiences

Challenge

Today's consumers expect an online-like shopping experience even when they are at the store. Being able to differentiate and provide unique in-store experiences will be vital for retail stores of the future, requiring 100% uptime and elastic services to enable in-store experiences.

Solution

Retail companies are undergoing digital transformation to improve performance, reduce costs, simplify operations, and improve security.

The AI-driven SD-WAN solution provides high-bandwidth connections, agility, security, cost savings, and AI-driven operations for the store of the future.

Benefits

- High throughput connections with reduced bandwidth usage
- Ability to add, remove, or modify services instantaneously, moving locations, and adding new stores with ease
- Ability to dynamically route traffic across the best connection based on real-time availability and performance
- A zero-trust security model, which guarantees that only authorized flows traverse the network
- Lower hardware costs, automation, and the reduction in complexity
- AI-driven insights for advanced visibility and simplified troubleshooting

Solution Brief

It is no secret that digital disruption, online shopping, and a worldwide pandemic have had a crippling effect on brick-and-mortar retail. The retail store is far from dead, however, despite the fact that many retail stores are closing. According to a 2023 Census Bureau analysis, 84% of retail sales still happen in stores. That said, retailers must blend digital and physical worlds to attract shoppers and provide unparalleled in-store experiences as they create the store of the future.

Retail companies are quickly undergoing digital transformation and stabilizing their business models by cutting costs, simplifying operations, and applying zero trust principles. Software-defined WAN (SD-WAN) is the perfect solution for their initiatives. It reduces costs by centralizing operations and cutting high-cost connections. It also virtualizes networks for simplicity and enables improved connectivity over heterogeneous networks to enable superior in-store experiences. The Juniper® SD-WAN driven by Mist AI™ preserves scarce and costly bandwidth by tunnel- and overlay- free Secure Vector Routing (SVR).

As a network built around the Juniper Session Smart™ Router, AI-driven SD-WAN gives retailers failsafe networking, agile deployments, unparalleled visibility, and fine-grained analytics in one high-performance solution.

The Challenge

Big box and boutique retailers are moving their workloads to the cloud to run big data analytics and understand their customers better. Stores always need secure connections to the cloud. The ideal solution needs to have session-based failovers over heterogeneous networks, load balancing to different clouds, one-click deployments in AWS, Azure, and Google clouds, and built-in PCI compliant architectures.

Targeted attacks aimed at retailers are the greatest risk that these businesses face today, with nearly one in three having already suffered revenue losses because of a cyberattack. SD-WAN has helped with security by service chaining firewalls at the branches. However, this is just another form of perimeter security. Forrester notes that many security breaches occur from within the organization, and perimeter security models are ineffective in such situations. What is needed is an SD-WAN solution that enables a zero-trust security model that protects sessions at each device by applying deny-by-default, hyper-segmentation, and directionality. This enables a PCI-compliant retail store with inherent built-in security.

For retailers, an outage during peak store hours means millions lost and can even cause business failure as brick-and-mortar stores rely heavily on high-level data transactions to operate their business.

Being able to differentiate and provide unique in-store experiences will be vital for retail stores of the future. This goes beyond simply having television displays updated in real time, good guest Wi-Fi, and point-of-sale units. Some retailers have already begun providing unique experiences, such as the Nike store in SoHo that allows customers to test out shoes on a treadmill, and Lowe's, where in-store robots help customers find products that they are searching for. Another example is Walmart, which is eliminating long checkout lines with a Scan & Go app that allows customers to scan items as they shop and pay over their mobile phones before exiting the store.

The possibilities are endless and immense. For traditional brick-and-mortar stores to flourish, retailers need to embrace digital transformation. Consumers are looking for unique in-store experiences. This requires the store to have superior connectivity to payment processing, data centers, public clouds, and to digital experiences around the globe (like to cameras in a park). SD-WAN is a perfect solution to enable these seamless in-store experiences.

Traditional Networking for Retail

To provide these in-store experiences, a retailer needs a superior network. Retail network designs from traditional network vendors require two routers, a switch, a firewall, a Wi-Fi module, an LTE device, and complex routing protocols in every store. IPsec VPN tunnels used in these legacy network designs add overhead, reduce performance, and lead to failover delays. This creates a complex in-store network which is rigid, difficult to manage and debug, and impossible to update. Lots of connected devices also raise the possibility of breaches with bolted on perimeter security.

Today's consumers expect an online-like shopping experience even when they are at the store. But several retailers have experienced outages, and this has led to loss of revenue and a damaged brand. There have been outages on Black Friday, Cyber Monday, and during holiday shopping days—the busiest times of the year. Server overload with routing systems unable to recognize and distribute system loads can lead to system crashes.

Traditional SD-WAN solutions repackage legacy technologies along with abstraction, segmentation, analytics, and orchestration. While this improves ease of deployment and results in some savings, it does not solve the issues associated with the underlying network. All traditional SD-WAN solutions use two or more WAN transport networks by building an overlay network using encapsulation such as generic routing encapsulation (GRE), Virtual Extensible LAN (VXLAN), IPsec, dynamic multipoint VPN (DMVPN), or a proprietary tunneling technology. Overlays and tunnels attempt to mask network weaknesses and inflexibility, but these strategies introduce wrappers that increase complexity, result in overhead, prevent end-to-end networking, and add costs.

Juniper AI-driven SD-WAN for Retail

The Juniper AI-driven SD-WAN solution provides a tunnel-free bandwidth saving mechanism using Secure Vector Routing. SVR ensures 30% to 50% bandwidth savings over traditional overlay solutions. There are also huge benefits in avoiding error-prone and complex configuration parameters for tunnels, especially key management and authentication methods. Zero trust security, ability to route and monitor traffic over heterogeneous networks, session-based failovers, routing with words, single pane of glass, zero-touch deployment, and cloud native implementations all work together to ensure a seamless end user experience.

Features and Benefits

Bandwidth

High throughput connections are needed to provide amazing in-store experiences such as augmented and virtual reality environments. In times of congestion and failures, retailers need a solution that can keep connections up and prioritize high-value connections such as credit card processing and surveillance video over streaming advertisements.

AI-driven SD-WAN reduces bandwidth usage by removing overhead. This increases available throughput and optimizes goodput. The solution also enables application classification and high quality of service (QoS) that enables high-value traffic to successfully traverse connections. AI-driven SD-WAN works on sessions rather than on packets to enable instantaneous session failovers over heterogeneous networks. High availability ensures that the sessions are kept alive despite a failure of a single Session Smart Router in the network.

Agility

Retails stores must have the flexibility to add, remove, or modify services instantaneously, move locations, modify connectivity, and add new stores with ease. Traditional SD-WAN solutions rely on static tunnels. Some protocols that enable dynamic tunnel building are complex, require configurations in advance, and result in hub-and-spoke architectures for scale. These are unsuited for the store of the future, which requires 100% uptime and elastic services to enable in-store experiences.

The AI-driven SD-WAN solution routes sessions towards services that the tenants have access to. The network exists to deliver services. Instead of having flows directed to IP addresses, the Session Smart Router enables intent-based networking by ensuring that sessions are directed towards services. This abstraction also enables location independence, and in-band signaling ensures that sessions are established without any complex external protocols. As services migrate from one location to another (virtual machine mobility), the sessions can be redirected to the new location without any interruption.

Service-centric routing also provides the ability to have the same service located in different locations and the network can decide in real time which service location to send the traffic to. This provides load and path balancing as required.

The ability to identify each session as a unique flow enables hyper-segmentation where each session can be individually encrypted and authenticated during transmission. The AI-driven SD-WAN solution enables specifying tenants and services as words along with access policies on which tenants have access to which services. To hide the complexity of dealing with IP addresses, the solution replaces routing logic with words and relationships between named elements.

Connection

Retail digital transformation requires the ability to dynamically route traffic across the best connection based on real-time availability and performance. This connectivity ensures superior service levels. However, traditional SD-WAN solutions are unable to reroute traffic instantaneously during failures as tunnels take considerable setup time causing applications to lose connectivity. Backup tunnels for fast failovers require an unnecessary secondary tunnel to always be kept alive. This causes scale issues.

The AI-driven SD-WAN solution can utilize innovative server load monitoring and intelligent network path monitoring to ensure that algorithms have the best possible heuristics available to choose the most appealing paths and servers.

Redundant or alternate paths between nodes in a network can be used to reroute traffic, improve resiliency, and maximize throughput. These maximally diverse paths can provide link and node protection for 100% of paths and failures if the failure does not cut the network into multiple pieces. There are no tunnel set-up delays and no issues with scale, resulting in a superior network.
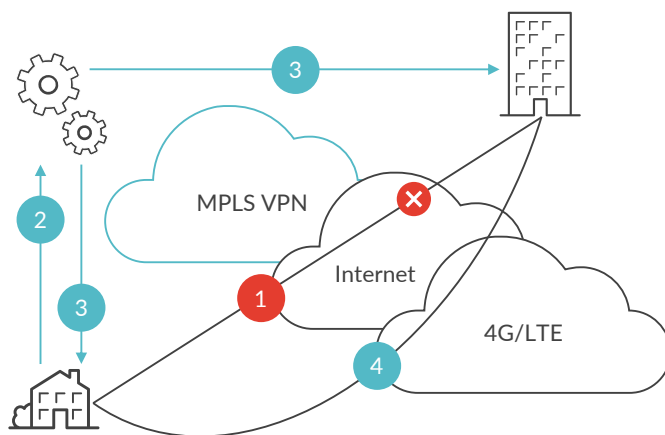

Figure 1: Dynamically re-routing traffic over the best available connection

Security

The introduction of numerous in-store endpoints that access data outside the store network increases security risks. BYOD, integration of functions, and smarter attack vectors have rendered traditional bolted-on perimeter security models ineffective.

The AI-driven SD-WAN solution adopts a zero-trust security model, which guarantees that only authorized flows traverse the network. This ensures:

- Access control for each route and authentication of all communications
- Policy-based inter-router traffic encryption
- Stateful firewall/denial-of-service (DoS)/distributed DoS (DDoS) protection at every node

Unlike traditional routing solutions that forward packets by default and use access control lists (ACLs) to block flows, the Juniper Session Smart Router denies traffic flows by default. Sessions are only established when there is a valid service that the tenant has access to as defined by explicit policy. These policies can be generic or granular depending on the context. This ensures a zero-trust security model where no unauthorized packets are ever sent across the network. As this functionality is enforced on all Session Smart Routers, it enables security everywhere rather than only at the perimeters.

Cost

In the face of competition from online shopping, traditional retailers are taking a radical stance to cut costs. While network budgets are getting cut, retailers are reinventing themselves with digital transformation. Many of the traditional SD-WAN offerings realize savings from switching connections from MPLS to Internet; however, they do not do much to improve savings that can come from lower hardware costs, or OpEx savings from automation, or the reduction in complexity from the removal of tunnels. They also add licensing and controller costs, which results in suboptimal savings.

The AI-driven SD-WAN solution runs on Juniper SSR Series appliances or low-cost x86 hardware. Centralized management, routing with words, hyper-segmentation, service-centric routing, and zero-touch provisioning (ZTP) reduce the need for in-store visits. It enables immediate deployment and modification of services. And the removal of tunnels reduces bandwidth costs and payments to public clouds.

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:

- Juniper Mist Premium Analytics improves visibility into link and application Quality of Experience (QoE).
- 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 Juniper Mist Cloud AI engine, driving simpler operations, reducing mean time to repair (MTTR), and providing better visibility into end-user experiences.
- 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. You can also sign up to view the Weekly Mist AI Demo.
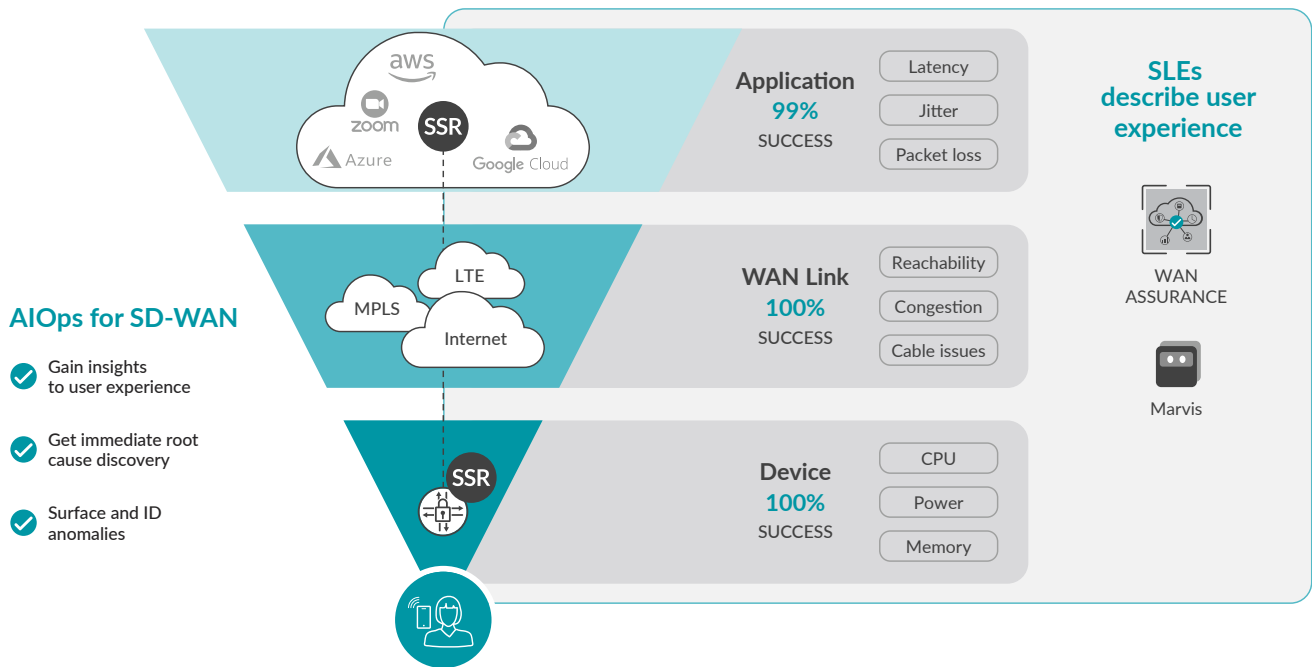
Figure 2: WAN Assurance Delivers Service Level Experiences for Users

AI-driven SD-WAN as a Managed Service

Juniper's AI-driven SD-WAN has been deployed for years, but companies want different options for bringing it on board. Using a Managed Service Provider (MSP) to deliver and maintain the solution is often the ideal way to consume an AIOps solution.

The market landscape is evolving, and there are many choices for consuming managed services. Juniper's strong service provider partnerships ensures success for many different delivery vehicles.

An Evolving Market Landscape

It's no secret that service providers have huge opportunities in the coming years, but the market is very competitive making it ideal for technology buyers who are under their own pressures to grow. With many IT teams understaffed and looking for resources, many customers will hit the "easy" button. This is why 73% of enterprises have their SD-WANs hosted by MSPs and that number is expected to grow for the next several years.

Pros and Cons of Service Options

Table 1 shows variations on service levels and the pros and cons for an enterprise to consider each one. By working with an MSP that partners with Juniper, the life of IT support in a changing world can be greatly simplified. All of the solution benefits apply equally well when delivered as managed services. Juniper is deeply invested in the success of service provider channels, and has Tier 1 references in many vertical industries. You can be assured that the Juniper partner you select has access to the full assortment of resources to ensure your success.

Table 1: Comparison of Fully Managed versus Comanaged Options

	Fully Managed Service	Co-Managed
Definitions	MSP manages solution and customer is completely hands off.	Solution designed and managed by both the customer and the MSP.
Pros	Time and cost savings as IT resources are supplied as needed. Greater assurance of necessary knowledge and experience. Integration with other network and cloud services. Ensured stability of the solution.	Potentially provides greater flexibility. Customer may have limited time to deploy or maintain a new WAN, or they may benefit from an accelerated deployment and a co-managed solution. MSP can handle connectivity while customer controls policies.
Cons	Customer may lose control over aspects of the solution. They may have configuration needs not supported by the MSP.	May incur overhead aligning business and technical goals between customer and MSP.

Summary—AI-driven SD-WAN Powers the Store of the Future

Traditional solutions sprinkled with automation are not sufficient to meet the needs of the store of the future. The traditional brick-and-mortar store must transform itself, generating entertainment and excitement, becoming a place that combines interaction, culture, and commerce. To do this, modern retail stores need next-generation technology.

Whether developed and maintained in-house or as a managed service, the tunnel-free AI-driven SD-WAN solution helps retailers blend digital and physical worlds to provide unparalleled in-store experiences, and optimized operator experiences as well. It is agile, giving retail stores the flexibility to add, remove, or modify services instantaneously, move locations, modify connectivity, and add new stores with ease. It optimizes connectivity, giving stores the ability to dynamically route traffic across the best connection based on real-time availability and performance. It is secure, using a zero-trust security model, which guarantees that only authorized flows traverse the network. It provides AI-driven insights into user experience and AIOps to identify network issues quickly for reduced MTTR. And it is cost effective.

Zero-trust security, ability to route and monitor traffic over heterogeneous networks, session-based failovers, routing with words, single pane of glass, zero-touch deployment, cloud native implementations, and AI-driven insights all work together in AI-driven SD-WAN to create the store of the future and enable retailers' success.

Related Resources

The following resources provide additional perspective and details on the AI-driven Enterprise.

Web Pages
- AI-driven SD-WAN
- Session Smart Router
- Mist AI and Cloud
- Marvis Virtual Network Assistant

Solution Briefs
- Enabling the AI Driven Enterprise
- Building a Secure AI-Driven SD-Branch
- Transforming Retail Networks with an AI-Driven Enterprise
- AI-driven SD-WAN Accelerates Digital Transformation
- Using the AI-Driven Enterprise in Quick Service Restaurants

Data Sheets
- Marvis Virtual Network Assistant
- Mist Wi-Fi Assurance
- Mist Wired Assurance
- Mist WAN Assurance
- SSR 100 Line of Routers Datasheet

Case Studies
- Dartmouth College
- Ossur
- The Gap

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.