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BUILDING A SECURE AI-DRIVEN SD-BRANCH

Using AIOps to Deliver a Simple, Scalable, and Secure SD-Branch

The evolution of distributed enterprises and branch architectures includes a rising tide of cloud services and applications, along with disparate devices and far-flung users. All these factors add complexity to branch networks, which cannot be properly maintained with traditional appliances or management systems.

The emerging branch network needs a software-based architecture that builds scale and reliability into the full network stack and across all domains—wireless, wired, and WAN, with client-to-cloud security. Juniper® Software-Defined Branch (SD-Branch), driven by Mist AI™ delivers this functionality and more.

The Challenge

In today's distributed workforce, enterprise IT must deliver superior experiences to both employees and customers. This is more critical than ever to business success, and it must be achieved amidst a complex network of devices, applications, and people who are under enormous pressure to perform.

Often working with limited resources, IT professionals need new solutions that do not work against them by adding to this complexity. New solutions must simplify the environment, optimize operations, and prioritize the user experience.

Branch offices have seen sharp increases in Software as a Service (SaaS) applications, Infrastructure as a Service (IaaS) deployments, users, and devices. Work itself is increasingly hybrid, and workplace styles are evolving accordingly.

AI and automation are key, and real-time communications are essential through collaboration tools. To address these challenges and meet current business objectives, enterprises need a network that is:

- **Agile** enough to handle the rapidly changing environment and lifestyle behaviors
- **Reliable** enough to deliver the experience customers and employees expect when they interact with the enterprise brand
- **Sophisticated** enough to rapidly fix any disruptions to that experience

Other applications that create demands on branch management include wayfinding and asset tracking, along with guest Wi-Fi and point-of-sale (POS) systems.

Challenge

- Traditional branch deployments are cumbersome, error prone, and operationally expensive.
- Complexity increases with a continued rise in applications, users, devices, and cloud services.
- Organizations have a limited understanding of how and why user experience is a revenue-impacting priority.

Solution

- Fully software-delivered branch networks span across the distributed enterprise.
- Mist AI in a microservices cloud provides service level experiences (SLEs) for insight into real-time user experience.
- Templates are easily duplicated and facilitate multisite installations and updates.
- Zero-touch provisioning (ZTP) provides claim codes and simplified shared key usage.

Benefits

- Simplified operations and rapid deployments at high scale
- Reduced mean time to repair (MTTR) with AI-driven insights and automation
- Improved user experience with assurances in all network domains
- Improved application performance with tunnel-free SD-WAN
- Rapid, high-scale deployments with ZTP

Solution Brief

The Solution: Juniper SD-Branch, Driven by Mist AI

Juniper SD-Branch, which is built on Mist AI and other features of the AI-Driven Enterprise such as Juniper® Session Smart™ Routing, brings the benefits of Juniper SD-WAN, driven by Mist AI into branch networks (LANs) and cloud environments with high scale and security. The power of Juniper SD-Branch spans enterprise wireless, wired, and WAN networks, and includes industry-leading indoor location services.

Mist AI targets and improves on service level experiences (SLEs) for users and operators across the distributed enterprise. These SLEs are maintained by the artificial intelligence (AI), machine learning (ML), and Natural Language Processing (NLP) capabilities of Mist AI with Marvis™ Virtual Network Assistant, providing AIOps throughout the enterprise networking environment. Juniper Session Smart Router further assures optimal experiences with zero-trust security and tunnel-free session-layer routing with adaptive encryption, along with built-in firewall functionality such as intrusion detection and prevention (IDP) and URL filtering.

Juniper SD-Branch greatly enhances and speeds the process of planning, deploying, and managing the distributed enterprise with device scanning and claiming techniques that set network-wide policies via template-based configurations. These differentiators in Juniper SD-Branch are made possible due to built-in AIOps and experience-level assurances in the wireless, wired, and WAN domains.

Features and Benefits

Branch environments need to be supported by reliable, secure, and experience-sensitive networks across the full stack in all domains. This includes reliable wireless and wired access in the LAN, a high-performing WAN with backup connectivity, and simplified operations for network administrators. Reliable and consistent Wi-Fi-coverage is needed in all locations (Figure 1).

An SD-Branch solution must continually measure and support optimal experiences in all domains and for all network users (employees, guests, customers, and operators).

Solution Components: AIOps for an SD-Branch

Juniper SD-Branch transforms the operator and user experience. Built on a common microservices cloud architecture and connected with a common AI engine, Juniper SD-Branch provides real-time insight into the user experience and assured service levels for wired, wireless, and WAN networking. SD-Branch includes AI-driven SD-WAN, switching, Wi-Fi, indoor location, and enhanced security—all delivered by the Juniper Mist cloud. Tunnel-free Juniper Session Smart Routing and Mist AI combine to deliver improved application performance, simplified operations, and a secure branch.

Juniper SD-Branch simplifies network configuration, deployment, and operations across wired and wireless LANs and WANs with cloud-based management, allowing IT teams to do more with less. The Juniper SD-Branch solution reduces operational complexity with unified, cloud-based, and AI-driven wired, wireless, and WAN management.

High performing WAN links with seamless back up connectivity

Simplified operations for network administrators

Deliver reliable wireless access for customers and employees

Reliable, consistent Wi-Fi Coverage Everywhere

Figure 1: Networking requirements for branch success.

Mist AI

The Mist AI cloud controls the Juniper SD-Branch environment (Figure 2).
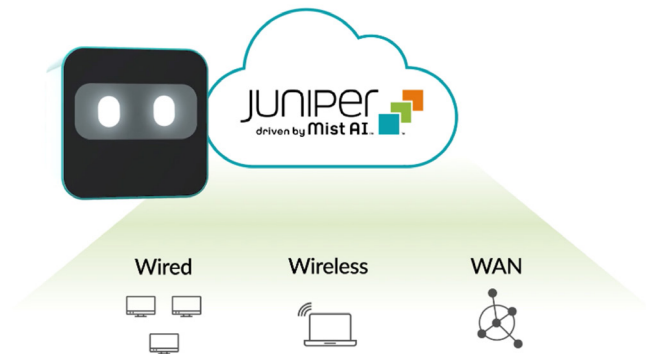

Figure 2: With SD-Branch, Mist AI cloud controls all network domains.

The advantages can be seen in how the solution resolves issues that may have sources in any network domain. The network can be explored end to end (client to cloud), and problems that may appear in one domain but are sourced from a different one can be resolved quickly and automatically.

Within all domains, Juniper SD-Branch provides SLEs that focus on potential issues in any network (Table 1).

Table 1: SLEs by Network Domain

Wireless	Wired	WAN
Overall service	Overall service	Overall service
Time to connect	Switch health	WAN edge health
Successful connections	Successful connections	WAN link health
Coverage	Throughput	Application health
Roaming		
Throughput		
Capacity		
Health		

These SLEs include classifiers that are continually updated based on analytics and that help quickly isolate and repair network problems. For example, wireless issues with successful connections can be classified as authorization or Dynamic Host Configuration Protocol (DHCP) issues, among others. Similarly, a problem with WAN link health could be a physical cabling problem or could be related to ISP reachability.

For an example of what Juniper SD-Branch can do, consider a user's poor video conferencing experience and how this might be affected by events in any of multiple domains (Figure 3).
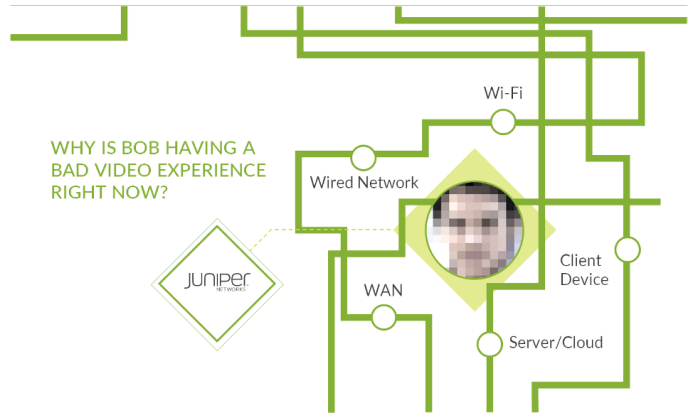

Figure 3: Many domains can contribute to poor experience.

With end-to-end service levels, event correlation, anomaly detection, and self-driving capabilities, administrators can easily isolate the domain and the failing component. A possible cause could come from the wireless access point—perhaps the user is having trouble connecting to it.

Further upstream, a bad Ethernet cable on the router could be causing the issue. The video application server, housed in a cloud data center, could be yielding low performance on a virtual machine.

Alternatively, there could be a problem with the user's laptop, Internet connection, or a node in the enterprise WAN. Mist AI can correlate SLEs and classifiers across all domains in order to find the underlying cause and either recommend or perform a correction.

Other examples of cross-domain problem solving include:

- A discovery that a problem with successful connections to an access point was caused by a configuration change in a WAN router (an MTU mismatch) that caused certificates to fail.
- A generic case of the Internet being slow turns out to be a disruption in a cloud security service.
- A slow messaging application could be affected by latency on the application server, or an LTE signal issue in the WAN, or even an issue in the LAN (wired or wireless).

With Juniper SD-Branch, Mist AI verifies behavioral changes in real time and makes adjustments on the fly to exceed customer service expectations.

Marvis Virtual Network Assistant

The Juniper SD-Branch analytics discussed above are integrated with Marvis Virtual Network Assistant for AIOps-based troubleshooting. Marvis, powered by Mist AI, proactively detects network issues before they impact users. As such, time-consuming manual IT tasks are replaced with AI-driven, proactive automation and self-healing capabilities, lowering networking operational costs and saving time and money.

Marvis Actions drives simplicity and transforms IT methodologies from reactive troubleshooting to proactive remediation. Marvis Actions delivers a self-driving network with automatic actions, and/or assistance to recommend actions (Figure 4).
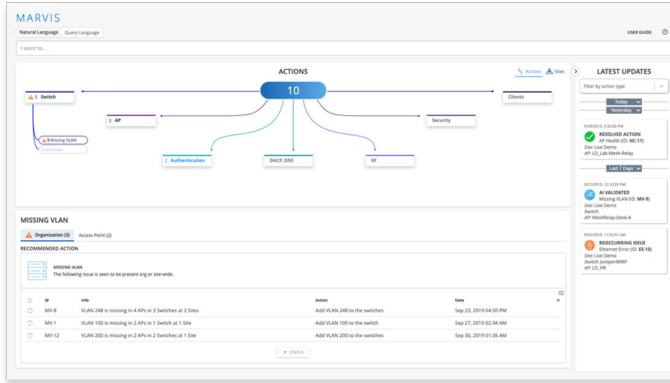

Figure 4: Marvis Virtual Network Assistant recommends actions.

For instance, operators can track upgrades, repair misconfigured ports or VLANs, identify bad cables, locate Layer 2 loops, or identify compromised devices and their attendant risks to the network.

Juniper SD-Branch also includes the **Marvis Conversational Interface** (Figure 5), which uses NLP to understand user intent and goals. Inquiries are contextualized to return specific results. Marvis understands intent, and it will take actions without requiring operators to remember specific dashboards or CLI commands to implement the change.
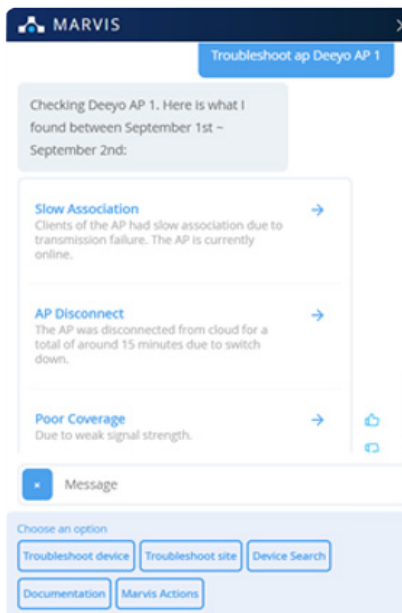

Figure 5: Marvis Conversational Interface understands user intent.

Marvis NLP transforms how IT interacts with the branch network.

AI-Driven SD-WAN

A key component of Juniper SD-Branch, the Juniper **SD-WAN, driven by Mist AI** solution (Figure 6) has built-in security capabilities that are an inherent part of the architecture.
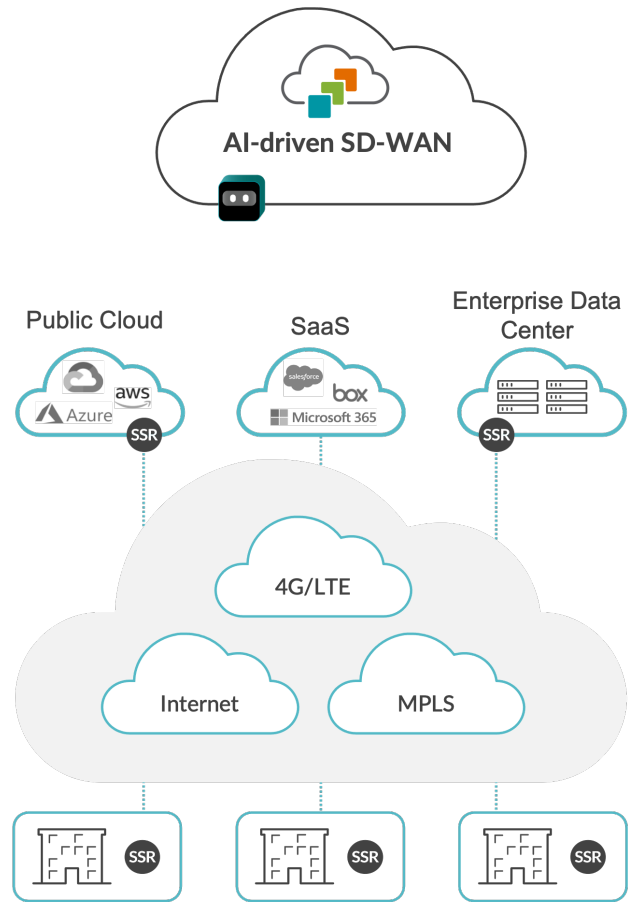

Figure 6: SD-Branch with AI-driven SD-WAN supports any business type.

Service-based routing ensures that sessions are delivered based on identity and context to relevant parties following unified policies. This ensures that a modern, cloud-centric digital business can provide secure access to users and devices wherever they are located.

Juniper SD-Branch supports any branch size as well as large campus and data center environments. Public clouds and SaaS applications are accessible over any common WAN or Internet links.

Juniper SD-WAN is driven by **Mist AI** (for AI-based insights and resolution) and Juniper **Session Smart Routing**, which provides application-layer control so that critical applications receive priority treatment and guaranteed uptime based on session policies and network status.

The Session Smart Routing fabric maintains full end-to-end context (state) of user sessions, services, and applications, as well as other dynamic workloads for a far more responsive,

application-aware network. The solution scales to tens of thousands of sites, while the tunnel-free architecture enables a 30-50% reduction in bandwidth costs.

Juniper SD-WAN manages traffic on the session layer, thus ensuring that applications and users (with unpredictable devices in disparate locations) are all mapped correctly. This "deny-by-default" approach to applications, servers, and consumers bakes zero-trust security into the SD-WAN fabric.

Performance is optimized with a unique Secure Vector Routing (SVR) protocol, ensuring that user experiences aren't sacrificed as a result of needless double encryption and overhead. SVR provides the ability to collect, analyze, and act upon session and application data.

Juniper SD-WAN, driven by Mist AI, is a self-driving network, identifying and acting on root causes of issues across IT domains, automatically fixing or recommending actions. The solution provides fine-grained quality of service (QoS), subsecond failover, and lossless application delivery.

Cross-Domain Security

Juniper SD-WAN has built-in capabilities to provide numerous security services from every router in the network. The Branch Security Pack contains intrusion detection and prevention systems (IDS/IPS) and URL filtering capabilities (Figure 7).

The main security advantage of Juniper SD-WAN is the deny-by-default approach to session access, providing a zero-trust environment. Many other security features are built in as well:

- Juniper SD-WAN includes built-in corporate network firewall functions and provides policy-based policing and forwarding. Enterprises can provide differentiated security and services to every traffic flow.

- Session Smart Routers can encrypt/decrypt and authenticate any packet flowing through them. They support adaptive encryption to dynamically detect encrypted sessions and prevent double encryption.

- Administrators must explicitly define policies for valid sessions. If no policy is associated with a session, the session will be dropped.

- If and when more Secure Services Edge (SSE) functionality is needed, Juniper delivers a suite of these capabilities under unified security management with the Juniper Secure Edge, providing a best-in-class security solution.

- Additionally, the rich application-aware capabilities of the Session Smart Router can identify specific sessions that require routing to other third-party security providers as required.

SSR Security

- Deny by default, zero-trust model
- Adaptive encryption
- Route directionality, Policy enforcement
- Layer 3/Layer 4 DOS/DDOS
- FIPS 140-2 certified
- Fine-grained segmentation
- Centralized policy management

Session Smart Router Branch Security Pack

- IPS/IDS
- URL Web Filtering
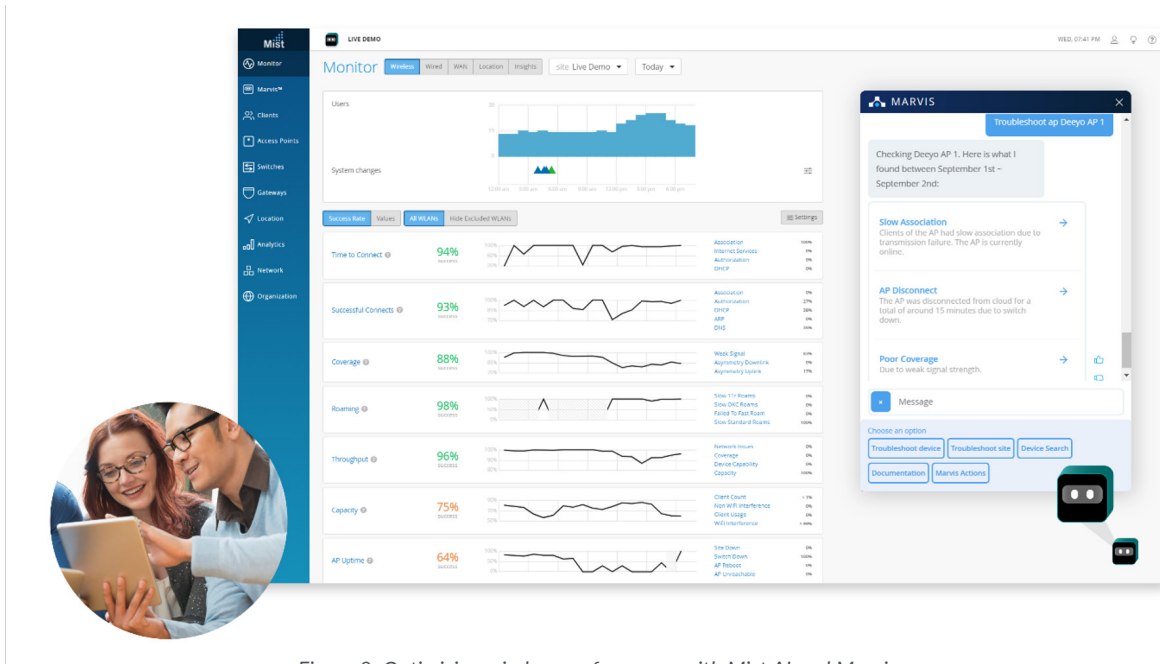
Figure 7: Secure SD-WAN with zero trust.

Figure 8: Optimizing wireless performance with Mist AI and Marvis.

Wireless Leadership

For the wireless domain of the SD-Branch, Juniper provides reliable and consistent Wi-Fi access in all business locations. The Juniper Series of High-Performance Access Points enables operators to set up pervasive and reliable Wi-Fi connectivity with consistent coverage network-wide. From a TCO perspective, this delivers maximum value to customers.

A wireless network managed out of Mist AI (Figure 8) provides proactive optimization of wireless performance.

Maintenance and troubleshooting throughout the branch are greatly simplified with the Juniper Mist cloud. Regular firmware and security updates can be pushed to all locations from a centralized management console, which also allows for remote troubleshooting of many common problems.

In addition to delivering the best 802.11ax (Wi-Fi 6) and 802.11ac Wi-Fi range and performance, Juniper Access Points incorporate a patented dynamic vBLE 16 element antenna array to deliver the industry's most accurate and scalable indoor location services (Figure 9). These personalized services greatly accelerate branch transformation across multiple industries, including retail, education, healthcare, hospitality, government, manufacturing, and more.
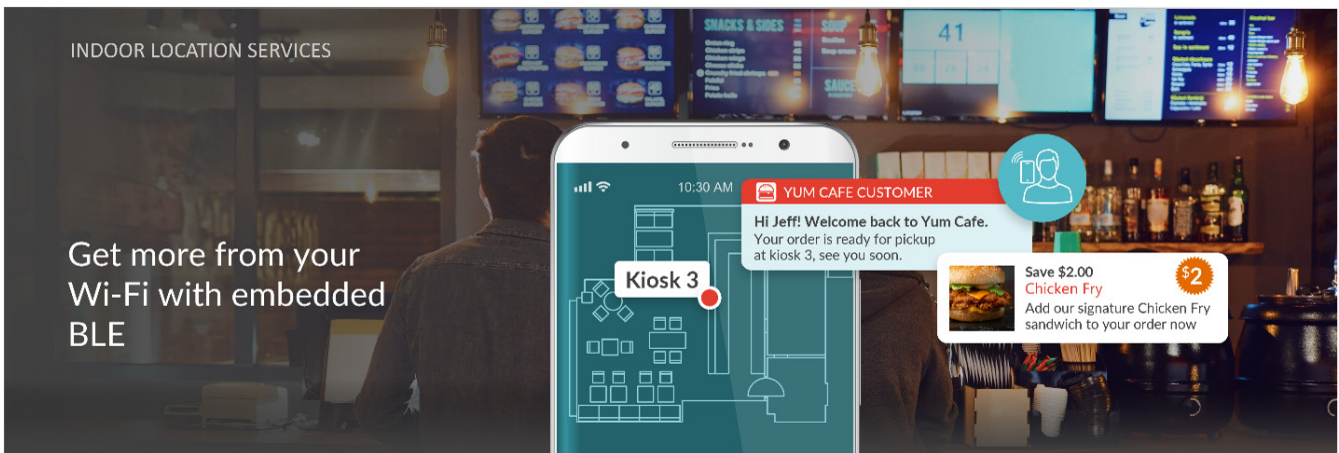

Figure 9: Indoor location services

Businesses gain key visitor insights from location data, which provides critical data points to optimize operations throughout the branch location. Executives can better understand foot traffic patterns and monitor visits, and staffing resources can thus be optimized to accommodate demand. Juniper Mist User Engagement provides technologies to improve the accuracy and agility of these services.

When appropriate, security cameras and other IoT devices can be triggered based on user location. Juniper Mist IoT Assurance provides a full suite of access control functionality for IoT and BYOD using multiple and private pre-shared keys (MPSK and PPSK).

Tapping into the Juniper Mist software development kit (SDK) allows enterprises and service providers to create application experiences that increase mobile engagement, build greater brand loyalty, and improve operations.

Wired Leadership

In the wired domain, Juniper SD-Branch delivers best-in-class connectivity with industry-leading solutions. As a physical controller is not required, Juniper's wired solutions require minimal on-premises physical infrastructure.

Juniper customers report needing as little as half the physical space of competing solutions, with corresponding reductions in power consumption. Not having the burden of a physical controller also allows businesses to use a SaaS licensing model for network operations and management.

As with the Juniper wireless portfolio, the Juniper wired portfolio allows for a streamlined campus deployment. Once deployed, Juniper SD-Branch ensures simplified troubleshooting; operators can quickly identify and troubleshoot "needle in a haystack" problems like misconfigured VLANs and bad cables with Juniper Mist Wired Assurance.

Days 0, 1, and 2 Operations

The deployment and provisioning for all Day 0, 1, and 2 operations is simple and secure. Preconfigured devices—access points, switches, and Session Smart Routers—are shipped to end-user sites and can be set up in a "plug and play" fashion in a matter of minutes.

Users can simply scan the claim code on the devices and the predefined configurations are instantly applied. They can then apply additional policies via templates and remotely provide updates from the Juniper Mist portal.

With the preconfiguration of device types, port detection, and dynamic configuration, this is a true zero-touch provisioning

(ZTP) operation. Further, for access points, a deployment service allows for automatic placement and orientation.

This approach scales to any number (thousands) of sites, and proactively prevents problems to ensure exceptional end-user experiences. Managers can quickly, easily, and accurately configure and make changes to new sites and applications.

For details on these operations, see Implementing Branch Networks for AI-Driven Enterprise Customers.

Industry Analyst Perspective

Juniper SD-Branch has been recognized as the unequivocal leader in the Gartner Magic Quadrant for Wired and Wireless LAN Access Infrastructure for three consecutive years. Gartner has positioned Juniper as a Leader, ahead of all other vendors in both completeness of vision and ability to execute (Figure 10).

Figure 10: Juniper SD-Branch leadership in wired and wireless (Source: Gartner)

Juniper is also a leader in Gartner's 2022 Magic Quadrant for Indoor Location Services, and Juniper is the only company in the leaders quadrant for both of these categories. Distributed businesses thus get two industry-leading solutions in one.

In addition to leadership positions in Wired and Wireless and Indoor Location Services, Juniper is a visionary in the SD-WAN Infrastructure Magic Quadrant. From a portfolio-wide perspective, this is the strongest combined position of any networking vendor.
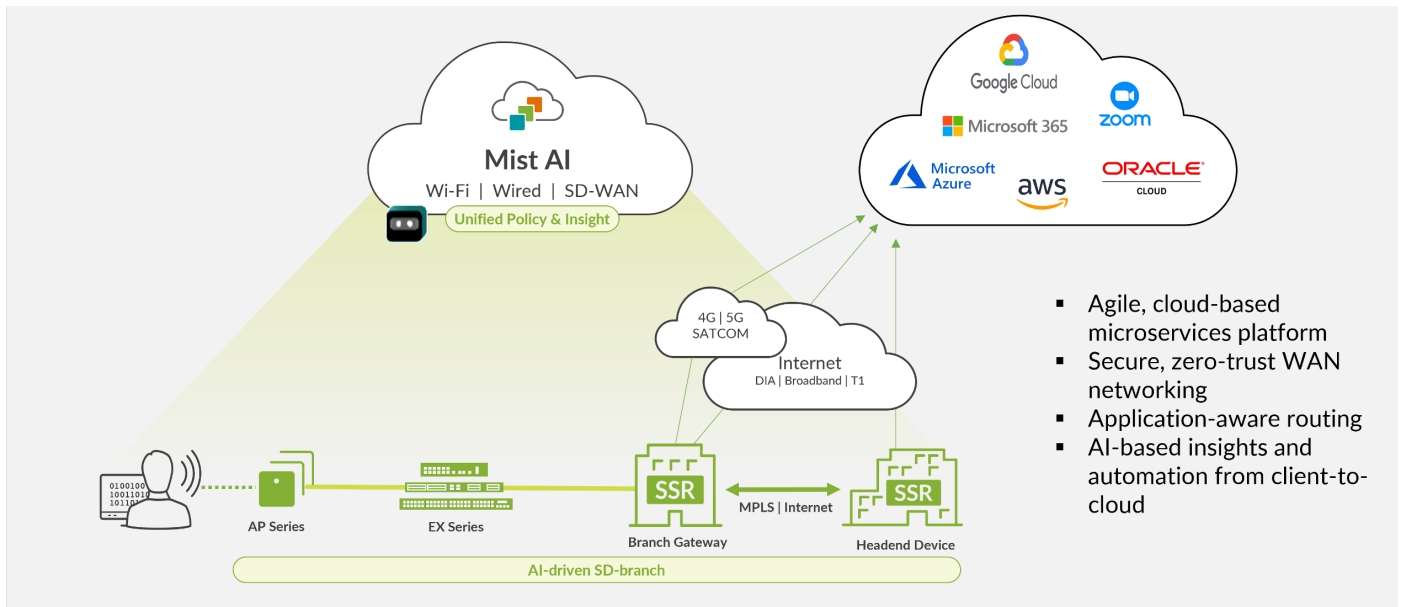
Figure 11 illustrates a high-level Juniper SD-Branch architecture.

SD-Branch Deployments and Perspectives

SD-Branch deployments are <u>growing year over year</u>; this is due to Juniper, driven by Mist AI, providing the industry's most sophisticated AIOps. Juniper is significantly ahead of other network providers.

Mist AI drives the full stack branch and its connections to all domains in the distributed enterprise. This includes Session Smart Router nodes in all locations: branches, headquarters, data centers, and the public or private clouds. The Juniper SD-Branch solution includes multiple WAN links for redundancy and/or load balancing.

Mist AI and Juniper SD-WAN create and enforce shared policies and AI-based insights for all locations, clouds, users, and devices in the distributed enterprise. The application-aware routing in Juniper SD-WAN is deny-by-default for zero-trust security and is tunnel free for bandwidth optimization. Any unencrypted traffic is adaptively encrypted.

For brownfield and WAN-only deployments, or when customer-specific capabilities are needed for a particular network function, Juniper SD-WAN is vendor agnostic when it comes to operating with other switching and wireless solutions, or third-party SSE solutions.

AmeriTrust Relies on AI-Driven Networking

AmeriTrust, a specialty insurance commercial underwriter and administration services company, looked to digital transformation to fuel growth. The company embarked on an ambitious effort to streamline IT operations, strengthen cybersecurity, and drive business success in an unpredictable and changing world.

As part of this initiative, AmeriTrust chose the Juniper SD-Branch solution to provide greater agility for its offices, data centers, and enterprise WAN. This full stack offering spans wired, wireless, and wide area networks.

Juniper SD-Branch allows AmeriTrust to react faster and make better decisions with AIOps. With Juniper SD-Branch, AmeriTrust delivers an optimized, secure user experience with zero-trust access control and segmentation.

Juniper wired and wireless access solutions, driven by Mist AI, deliver predictable, reliable, and measurable connectivity at AmeriTrust's offices. Juniper cloud services, including Juniper Mist Wi-Fi Assurance, Juniper Mist Wired Assurance, and Marvis Virtual Network Assistant, provide clear visibility into the user experience and accelerate troubleshooting when issues arise.

For more information on the Juniper SD-Branch solution deployed at AmeriTrust, see the <u>AmeriTrust Case Study</u>.

Customers Enjoy Better Dining Experiences at Top-10 Quick Service Restaurant Franchisee

A top-10 (U.S.) Quick Service Restaurant (QSR) franchisee found that Juniper SD-Branch on a full-stack network delivered a better in-restaurant experience. Restaurant locations had suffered from frequent point-of-sale downtime, unreliable guest Wi-Fi, and complex configurations leading to customer disappointment, employee frustration, and financial loss.

Restaurants supported by this franchisee now enjoy much quicker Day 0 and Day 1 operations; in the end, it was the real-time insight into the service levels for wired, wireless, and WAN experience that secured the business relationship. The QSR

franchisee had a smooth infrastructure rollout with an iOS app and a photo option.

By deploying Juniper Access Points, EX2300 Ethernet Switches, Juniper Mist Wired Assurance, and Session Smart Routing across 300 locations, with Marvis for rapid troubleshooting, restaurants quickly improved customer experiences across all locations.

The QSR franchisee enjoyed major savings via less bandwidth required with Juniper SD-Branch, and reduced occurrences of human error with Mist AI capabilities. Restaurants now have much faster service and shorter lines leading to a better overall restaurant experience and faster time to revenue.

Medical Supplies Conglomerate Improves App Performance and Reduces Costs

A medical supplies conglomerate, primarily in the business of veterinary and dental products, needed to simplify operations and improve application performance. They also needed better efficiency from their physical network infrastructure.

After evaluating a total of four competing solutions, the company chose Juniper SD-Branch, including Juniper Session Smart Routing and Juniper Mist WAN Assurance managed by Juniper Mist cloud.

As a result, they have enjoyed simplified template-based deployments for their numerous branch locations, and simplified operations with AIOps. Juniper SD-Branch has provided the company with improved application performance and large bandwidth savings.

Summary

Juniper SD-Branch provides AI-driven insights to ensure each branch site is optimized to deliver the best experience for employees, customers, and operators. This includes optimizing mobile traffic and streamlining ordering and point-of-sale (POS) operations.

Juniper is the leading wired, wireless, and SD-WAN vendor with the easiest and most comprehensive Day 0, 1, 2 operations in the industry. Juniper also leads in indoor location services that can drive better user engagement and asset visibility.

Next Steps

For more information and assistance in starting or continuing your SD-Branch journey, contact your Juniper account representative.

You can also see firsthand how to perform many SD-Branch tasks by setting up an account at manage.mist.com and following the tutorials. Ask your account representative for help getting started.

Resources

Solution Briefs and White Papers

- Client to Cloud Assurance with an AI-Driven Enterprise
- Implementing Branch Networks for AI-Driven Enterprise Customers
- Session Smart Routing: How it Works
- Using the AI-Driven Enterprise in Quick Service Restaurants

Analyst Recognition

- 2021 Gartner Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure
- 2022 Gartner Magic Quadrant for Indoor Location Services

Videos

- AI-driven SD-WAN in Action: Design, Deploy, and Operate a Full Stack Branch with Mist AI
- AI-driven SD-WAN Demo: WAN Assurance
- AI-Driven Enterprise in Action – MSP Dashboard Demo
- Juniper AI-driven Enterprise: Full Stack AIOps
- Meet Marvis

Demos

- AI-Driven Enterprise

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