ENSURE PERFORMANCE AND EFFICIENCY WITH AI-NATIVE SD-WAN SOLUTION BRIEF

Secure, AI-Native Solution Improves Performance And Simplifies Operations For The Enterprise

Challenge
Cloud networking reshapes application delivery, creating performance, security, and agility challenges that impact experiences for operators and users.

Solution
An AI-Native SD-WAN is a service-centric and application-aware solution that optimizes experience for users and meets stringent performance, security, and availability requirements.

Benefits
- Delivers AI-native insights for simplified and automated remediation
- Improves application performance with a tunnel-free and session-intelligent fabric
- Provides zero-trust security including IDS/IPS, URL filtering, and SASE integration
- Scales to any size enterprise with client to cloud assurance

Important trends are transforming wide area and cloud networking. The changes are so dramatic that security, networking, and the cloud are converging, and enterprises need to keep the network simple. The continued adoption of architectures such as the Secure Access Service Edge (SASE) is one of many examples of how new technologies reduce complexity in the network.

More than 80% of all enterprises consider Artificial Intelligence (AI) crucially important, and 93% of enterprises have goals to move towards unified management for wired, wireless, and SD-WAN solutions, which explains the continued growth of Software-Defined Branch (SD-Branch).[1]

Dell'Oro expects the SD-WAN market to double by 2027, while Gartner and IDC report similar forecasts. Similarly, TeleGeography anticipates that by 2026, 81% of the sites in the 5,000 largest enterprises will install SD-WANs.[2]

In addition to these trends, businesses are adopting cloud-based applications and services to minimize infrastructure cost and complexity, increase IT agility, and accelerate digital transformation. According to a 2023 industry survey, 97% of enterprises have a multicloud strategy with 72% embracing hybrid cloud solutions.[3]

The Challenge

SD-WANs are essential to modern businesses, and their usage continues to expand in forward-looking, distributed enterprises. For this reason, early SD-WAN adopters are refreshing and modernizing their original solutions.

Upgrades are needed because traditional WAN and SD-WAN solutions are not meeting evolving business requirements. Most SD-WAN solutions tunnel traffic across public Internet connections to protect data privacy. They place multiple data flows into a single overlay tunnel, which inhibits traffic classification and management.

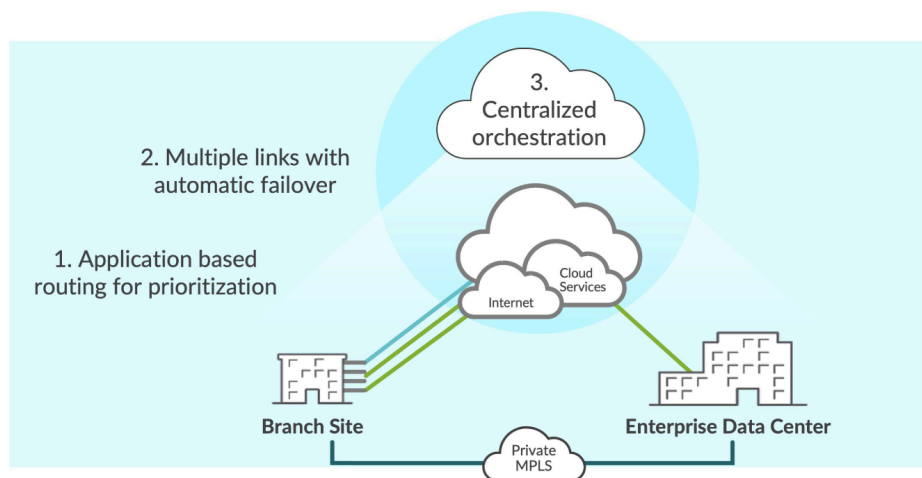Many SD-WANs fulfill a minimal set of requirements (Figure 1).

Figure 1: Skeletal SD-WANs meet minimal legacy requirements

[1] [Bringing it All Together: Managing SD-WAN with Campus and Branch Networks](#), Enterprise Strategy Group, September 2023.
[2] SDxCentral, [SD-WAN By the Numbers: Market Growth, Size, and Adoption](#), Sean M. Kerner, August 1, 2023.
[3] [Flexera 2023 State of the Cloud Report](#)

SD-WANs have three primary components:

1. Application-based routing for prioritizing critical traffic

2. Multiple circuits with high availability and automatic failover

3. Centralized orchestration

These capabilities are generally implemented with IPsec tunnels, which present many limitations:

- They suffer from performance impact due to unnecessary overhead
- They often take too long to failover, causing further performance reduction
- They are complex to set up and maintain

Figure 2: Juniper Networks AI-Native SD-WAN

The Juniper Networks AI-Native SD-WAN Solution

[Juniper® SD-WAN, driven by Mist AI](#), is a state-of-the art, service-centric networking solution that eliminates the inherent inefficiencies and cost constraints of traditional WAN products and legacy SD-WAN solutions. This fully software-based solution enables reliable, high-performance connectivity, simplifies management with automation and AI-native insights, and is inherently "zero trust" secure (Figure 2).
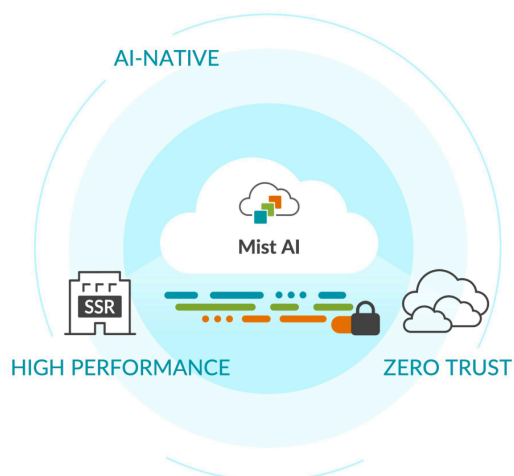
Juniper [Session Smart™ Routing](#) provides the basis for this unique SD-WAN solution—its tunnel-free architecture is built to deliver zero trust security and the highest performance in the market. The solution includes a deny-by-default access policy, which provides greater security than tunneling solutions, without the performance and scaling limitations.

Tunneling solutions add 30 to 50% additional bandwidth overhead per packet. Session Smart Routing uniquely routes sessions rather than packets, without the use of tunnels. Session Smart Routing also reduces costs and optimizes network traffic flows.[4] (Read [Session Intelligence in a Tunnel-Free SD-WAN](#) and [Why Session Awareness Matters](#) for more details.)

Finally, AI-Native SD-WAN is centrally managed from the Juniper Mist™ Cloud, which provides unmatched agility and visibility as well as automation for faster deployments and AI insights to speed troubleshooting.

Focusing on the user experience, AI-Native SD-WAN provides client-to-cloud automation with insights and self-driving actions across the full stack of wireless, wired, and WAN domains.

Key features and benefits of AI-Native SD-WAN include:

- **Higher performance:** Tunnel-free session-intelligent routing provides improved bandwidth efficiency and instant failover. Additional benefits are also realized for cloud connectivity, differentiated services, and fast failover.
- **Greater operational efficiency:** Day 0/1 operations include Zero-Touch Provisioning (ZTP), automation, and flexible templating for massive scale. Day 2/2+ operations include sophisticated AI-powered insights for faster troubleshooting.

- **Full stack branch capabilities:** When integrated with wired and wireless LANs, AI-Native SD-WAN provides an SD-Branch solution, with unified client-to-cloud management. Operators enjoy end-to-end visibility through a microservices-based cloud for maximum agility.
- **Heightened security:** Robust security features include Zero Trust, IDS/IPS, URL filtering, and SASE support.

Solution Capabilities and Benefits

AI-Native SD-WAN provides numerous unique benefits to distributed enterprises of all sizes and in all industries.

Tunnel-Free for High Performance

AI-Native SD-WAN provides huge throughput gains by removing the overhead of tunnel headers, and replacing them with a more effective and lightweight design for a major increase in user payload (goodput) transmission (Figure 3).
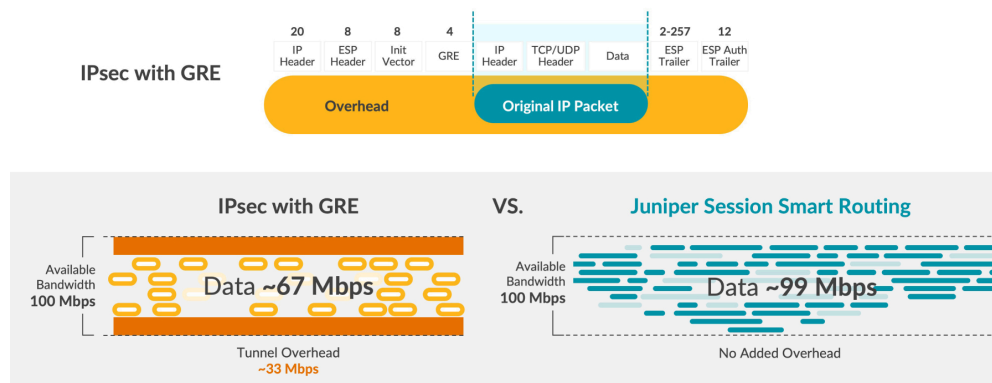

Figure 3: Wasted bandwidth with tunnels, greater goodput with Session Smart Routing

Depending on the application, there are big savings over IPsec and VXLAN-based networking schemes. Packet size is also a factor; for instance, for small voice packets, the savings can be much higher.

AI-Native SD-WAN ensures highly secure and reliable WAN connectivity without the cost or performance overhead of traditional VPN tunneling schemes. Integral bandwidth optimization capabilities improve the performance of lower quality WAN links. The largest scale deployment of Session Smart Routers in an SD-WAN installation is 10,000+ sites.

Finally, the QoS toolset in Session Smart Routing enables differentiated services along with features such as subsecond failover, prioritization, shaping, duplication, and error correction across the network. (Read Session Smart Networking: How it Works for more details.)

WAN Assurance and Operational Efficiency

AI-Native SD-WAN provides automation and service levels to the SD-WAN solution. This improves operational efficiencies from Day 0/1 operations to Day 2 and beyond.

Day 0 and Day 1

AI-Native SD-WAN supports ZTP for plug-and-play installation at remote sites with little or no IT expertise required. IT teams can onboard, configure, and deploy Session Smart Routers with ZTP and realize easy onboarding using claim codes.

This is accomplished with simple templating for rapid scale deployments. Established configurations can be applied to multiple sites—Session Smart Routers will then be onboarded and configured.

Juniper SSR Series Routers are purpose-built, high-performance platforms. Specifications are detailed in the following datasheets, which also identify the usual locations (branches, campuses, and data centers) where these routers would be installed:

- SSR 100 Line of Routers
- SSR 1000 Line of Routers

Day 2 and Beyond

Juniper Mist WAN Assurance and the Marvis™ Virtual Network Assistant ensure that customers can understand and improve their users' experience throughout the distributed enterprise (Figure 4).
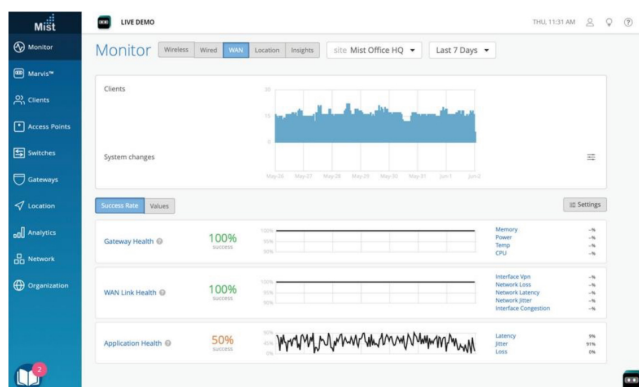
Figure 4: WAN Assurance delivers service level experiences

The analytics for WAN Assurance enable the lowest possible mean time to repair (MTTR) for any issues in the WAN. Marvis includes a conversational AI interface (with ChatGPT support) to solve issues anywhere in the network, providing insights and remediations for devices, users, and applications (Figure 5).
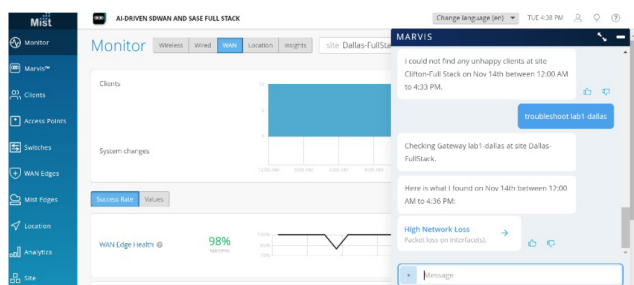
Figure 5: Marvis Virtual Network Assistant

Marvis Actions (Figure 6) helps drive operational simplicity and transform IT from reactive troubleshooting to proactive remediation.
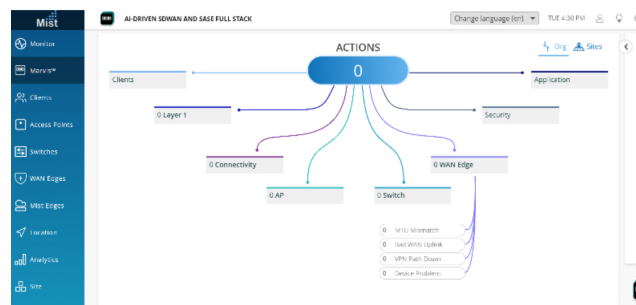
Figure 6: Marvis Actions

Marvis offers a high-level view that delivers visibility into network issues at an organizational level, so administrators know exactly what they need to prioritize. As sites get added, Marvis Actions scales with ease: no additional setup is required.

Marvis uses advanced natural language processing (NLP) to understand user intent and goals. It contextualizes inquiries to return specific results and takes automated actions to remediate errors. Deployments report an 85% reduction in operational costs.[5]

These AI-based efficiencies bring further benefits and cost savings by reducing truck rolls, and cloud-based management ensures that enterprises have less on-premises equipment, yielding considerable sustainability benefits.

With the benefits of WAN Assurance and Session Smart Routing, AI-Native SD-WAN intelligently connects all branch offices (including home microbranches) to locations where the most critical business assets are held, whether a corporate data center or a public cloud, multiple clouds, or cloud service applications (Figure 7).
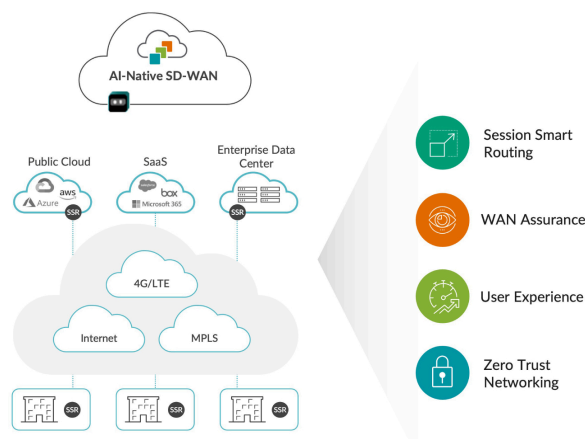
Figure 7: AI-Native SD-WAN supports multicloud networking with optimal user experiences

A Full-Stack Solution with SD-Branch

Built on a common microservices cloud architecture, Mist AI provides real-time insights into user experiences and assured service levels into the WAN, wired, and wireless networking domains.

This full-stack solution comprises Juniper Networks SD-Branch, which includes AI-Native SD-WAN, switching, Wi-Fi, indoor location, and enhanced security—all delivered by the Juniper Mist Cloud.

[5] See ACG Research, Financial Benefits of Juniper AIOps Solutions in Enterprise Networks

Integrated Security

Security is assured at every point and the network is inherently zero trust with AI-Native SD-WAN's deny-by-default approach to session access. Security capabilities also include unique encryption and authentication keys, custom traffic engineering parameters, and tight access control at the individual session level.

AI-Native SD-WAN also offers a flexible way to segment and isolate traffic, allowing administrators to apply different profiles based on the application or service that the session contains. Further fine tuning of content access is provided by a Juniper Advanced Security Pack that includes Intrusion Detection and Prevention (IDP) and URL filtering. The full set of security features in AI-Native SD-WAN is shown in Figure 8.

Session Smart Networking Security
- Centralized management
- Full Encryption
- Zero Trust Model
- Route Directionality, Policy Enforcement
- Layer 3/Layer 4 Firewall
- FIPS 140-2 & JITC Certified
- Fine-grained segmentation

SSR Advanced Security
IPS/IDS
URL Web Filtering

Figure 8: Secure SD-WAN with zero trust

When combined with cloud infrastructure via Secure Service Edge (SSE) functionality, Mist AI provides the basis for a full SASE solution. This includes SSE functionality such as Firewall as a Service (FWaaS), Cloud Access Security Broker (CASB), Data Loss Prevention (DLP), and Secure Web Gateway (SWG).

Secure Edge Connectors enable seamless integrations from Juniper AI-Native SD-WAN to any SSE. They make it easy to offload traffic from a Session Smart Router to an SSE. Administrators simply input corresponding information (such as pre-shared key and hostname/IP address) in the Juniper Mist Cloud and in the SSE to create secure edge connections.

With this robust security, enterprises can seamlessly transition to a cloud-delivered, single-stack architecture, securing their workforce wherever they are and delivering optimal user experiences. For more information, see Session Smart Routing Security Capabilities at-a-Glance.

Summary

Traditional SD-WAN solutions support only baseline functionality for traffic prioritization, path selection, and management. This is inadequate to address modern WAN requirements such as multicloud and AI-based remediation.

AI-Native SD-WAN eclipses these solutions with a tunnel-free architecture, combined with intelligent service-based routing and AIOps. Network administrators and the ops team gain end-to-end visibility and granular control over individual data flows, and can create application-specific SLAs for maximum efficiency.

The solution provides industry-leading performance, high availability, and differentiated services. Key efficiencies are the function of ZTP for Day 0/1 operations and WAN Assurance for Day 2/2+ operations.

AI-Native SD-WAN is a major component of Juniper's SD-Branch solution for full-stack support in the wired, wireless, and WAN domains, enabling a complete AI-native enterprise. Individual domains for an SD-Branch may be added at any time, with no change to existing deployments.

Security is built in from the ground up with AI-Native SD-WAN, beginning with deny-by-default access for a zero-trust environment. Advanced security features include IDS/IPS and URL filtering, while SSE Connectors enable SASE support.

For implementation examples of AI-Native SD-WAN, see our case studies highlighting Seagate, Messho, and Granite Telecommunications.

Next Steps

To learn more about Juniper's AI-Native SD-WAN, contact your Juniper account representative or visit Juniper.net/sd-wan. Juniper also provides a Weekly Mist AI Demo, allowing you to see the AI-Native SD-WAN (and AI-Native Enterprise) in action.

Finally, you can experience firsthand how to perform many of these tasks by setting up an account at manage.mist.com and following the tutorials. Ask your account representative to help you get started.

About Juniper Networks

Juniper Networks believes that connectivity is not the same as experiencing a great connection. Juniper's AI-Native Networking Platform is built from the ground up to leverage AI to deliver the best and most secure user experiences from the edge to the data center and cloud. Additional information can be found at Juniper Networks (www.juniper.net) or connect with Juniper on X (Twitter), LinkedIn, and Facebook.

Resources

Web Pages

- Mist AI and Cloud
- Session Smart Router

Solution Briefs and White Papers

- Client to Cloud Assurance with an AI-Native Enterprise
- Session Intelligence in a Tunnel-Free SD-WAN
- AI-Native SD-WAN Secures Cloud-Era Networks

Analyst Briefs

- (ESG) Bringing it All Together: Managing SD-WAN with Campus and Branch Networks

Videos

- AI-Native SD-WAN and Session Smart Networking Explainer
- Simplified: AI-Native SD-WAN with Session Smart

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