OPTIMIZING CLOUD EXPERIENCES WITH AN AI-DRIVEN ENTERPRISE

Using Juniper Session Smart Networking and Mist AI to enhance cloud experiences

Challenge

- *Heterogenous toolsets make multicloud networking difficult.*
- *Poor, siloed visibility from end-to-end*
- *Security of sensitive data*
- *Migrations are often complex especially when handling overlapping IP addresses.*
- *Costs need to be mitigated.*

Solution

- *AI-Driven SD-WAN supports secure, high-performing cloud networking*
- *Cloud-based management with Mist AI.*
- *Application-awareness, native traffic prioritization, and adaptive encryption for improved performance.*
- *A tunnel-free architecture to reduce overhead.*
- *Built-in IDP IDS, web filtering, and zero trust networking principles*

Benefits

- *Cloud networking that's easier to manage*
- *Insight into user and operator experiences*
- *30-50% cost reduction for data egress*
- *Unified security posture*
- *Simplified migrations as IP addressing/routing remains intact*
- *Sub-second failover for business continuity*

Solution Brief

To maintain leadership positions, enterprises are embarking on large-scale digital transformation efforts, seeking to save costs while handling increased demands on their networks. Preparing for growth frequently includes operating in a secure multicloud or hybrid-cloud architecture that delivers performance, agility, and a good ROI.

Strategic business intent for many of these enterprises—and service providers as well—includes moving applications, information, and processes from legacy technologies to the cloud, as well as the strategic usage of critical Software as a Service (SaaS) applications where relevant.

But cloud migration presents some widespread challenges in ensuring good user experiences. Examples include poor performance and scale, the complexity of disparate technologies across clouds, and security concerns in what is often a comparatively opaque environment.[1]

These potential challenges are mitigated with Juniper® SD-WAN, driven by Mist AI™ with Session Smart™ Networking.

Enterprises and service providers gain:

- End-to-end visibility of user experience across all facets of cloud networking use cases including onramp, multicloud, and SaaS
- Advanced networking for running in any cloud environment across regions, or routing between public and private clouds
- Enhanced application and database performance with measurable and enforceable Service Level Experience (SLE) agreements
- Reduced costs

[1] See Multicloud Networking: Connecting and Securing the Future based on a report from Enterprise Management Associates.

The Challenge

Security, agility, performance, and costs have become difficult to manage or control across varied cloud platforms. The challenges with cloud networking today—especially in multicloud and hybrid cloud environments—are:

- **Bandwidth:** Traditional networking methods like VPN have limited throughput to cloud providers.
- **Cost:** Egress fees and growing operational costs associated with Infrastructure as a Service (IaaS) usage reduces the intended ROI for cloud networking.
- **Security:** A cloud-leveraged ecosystem often lacks a uniform security posture making management and application of policies difficult, leaving enterprises vulnerable. Traditional cloud vendors offer inadequate protection.
- **Operational Complexity:** Using disparate tools to manage daily operations from premises and across cloud providers is time consuming and frustrating, and leads to poor visibility and user experience.

Enterprise Management Associates validated these observations in a January 2023 study (and subsequent webinar). Yet, even with these challenges, cloud-based options bring substantial benefits, including access to new services and increased business agility, which is why worldwide end-user spending on public cloud service is forecast to grow 20.7% to nearly $600 billion USD according to the latest forecast from Gartner.

The Solution

Juniper AI-Driven SD-WAN optimizes multicloud networks in several key ways. Mist AI brings the benefits of AIOps to the cloud networking environment. Session Smart Networking provides a session-aware and service-centric WAN topology, which is inherently secure with a deny-by-default access policy, and also includes many other firewall and security features that enhance cloud networking.

AI-Driven SD-WAN

Juniper AI-Driven SD-WAN (Figure 1) is a cloud-managed, tunnel-free, secure networking solution that resolves many of the inherent challenges in cloud connectivity. Key features include:

- A centralized management platform for configuration, deployment, and monitoring of cloud networking, including AI-driven automation and troubleshooting
- Tunnel-free architecture to improve performance, minimize complexity, and reduce data egress costs by 30% to 50%
- Uniform security posture across cloud ecosystems with built-in Intrusion Detection System/Intrusion Detection and Prevention (IDS/IDP) and URL filtering

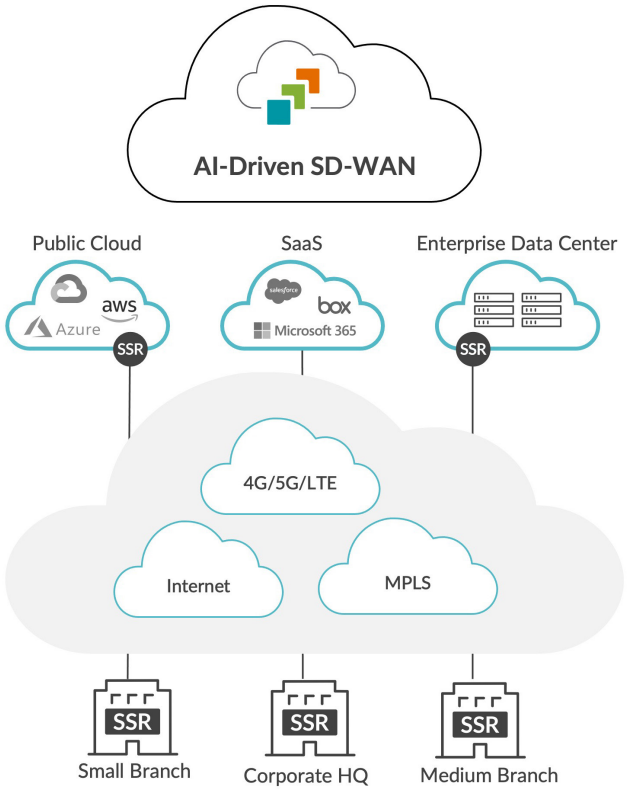

Figure 1: AI-Driven SD-WAN connects cloud environments while resolving connectivity challenges.

Unifying the cloud-networking experience in this solution is Mist AI, which provides the portal for management. The platform is architected using microservices for advanced agility. At the edge sits the Session Smart Router to enable all points of connection in the AI-Driven SD-WAN. Fast and secure cloud networking is achieved using the Secure Vector Routing (SVR) protocol with improved throughput and bandwidth utilization.

Table 1 provides key product features within the AI-Driven SD-WAN.

Feature	Definition
Session Smart Networking	Routing solution that powers AI-Driven SD-WAN and is designed to provide users with exceptional experiences: • Built on an application-aware and zero-trust secure network fabric • Meets the most stringent enterprise performance, security, and availability requirements • Overcomes inherent inefficiencies of conventional solutions with a tunnel-free architecture for performance, fast deployments, and cost savings • Runs on CPE or data center network servers, and in the cloud for flexible deployments
SVR	Transformational routing architecture used by SSR router that enables the network to optimize application and service delivery, while providing a deny-by-default access model for inherent security. As opposed to tunnel-based systems, SVR is 30% to 50% more efficient while ensuring the highest quality user experience from client to cloud.
Mist AI	AI-driven operations and support that uses a combination of AI, ML, and data science techniques to optimize and deliver real-time insight into user experiences and simplify operations across wireless access, wired access, and SD-WAN domains.
Marvis Actions	The proactive method of using Marvis™ Virtual Network Assistant to highlight user-impacting issues across an organization. Administrators can direct Marvis Actions to fix issues automatically as they occur.
Marvis Virtual Network Assistant	Marvis Virtual Network Assistant is a conversational AI assistant that uses Natural Language Processing (NLP) to rapidly diagnose and troubleshoot disruptions to user experience across wired, wireless, and WAN domains.
SLE	Metrics for measuring service experiences in wireless, wired, and WAN domains. These include overall service, device or link health, throughput, capacity, etc. They can be used by Marvis for automated network tuning.

Session Smart Networking in the Cloud

The Juniper Session Smart Router (SSR) enables enterprises to connect from branches or data centers to public clouds and popular SaaS applications.

SSR routers are used in cloud networking in multiple ways (Figure 2):

- **In the cloud:** SSR routers provide advanced networking for running in any cloud environment across regions, or routing between public and private clouds. Efficient multiregion and multicloud operations are important for cost savings, avoiding excessive charges when routing within or between public clouds.
- **To the cloud:** SSR routers optimize cloud onramp services to AWS, Azure, and/or Google Cloud.
- **SLEs:** SSR routers enhances SaaS applications with measurable and enforceable SLE agreements. Session Smart Networking improves Internet routing to ensure the best performance for SaaS applications.

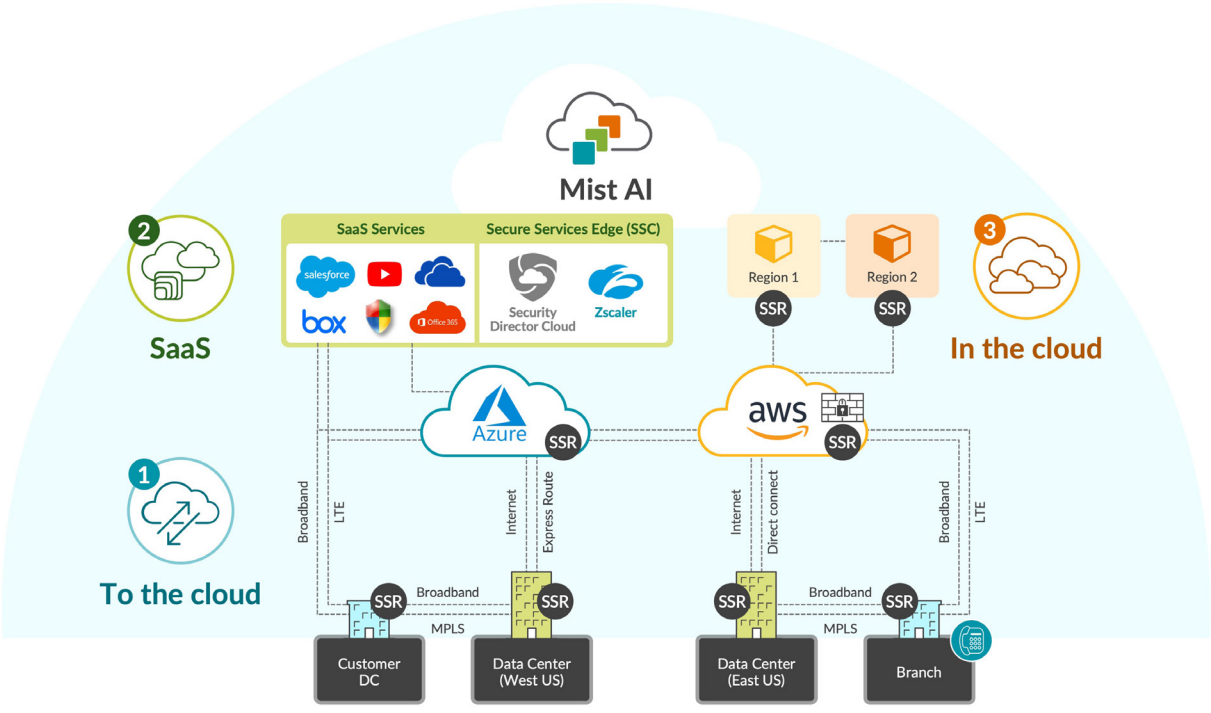

Figure 2: Session Smart Networking and Mist AI simplifies cloud networking.

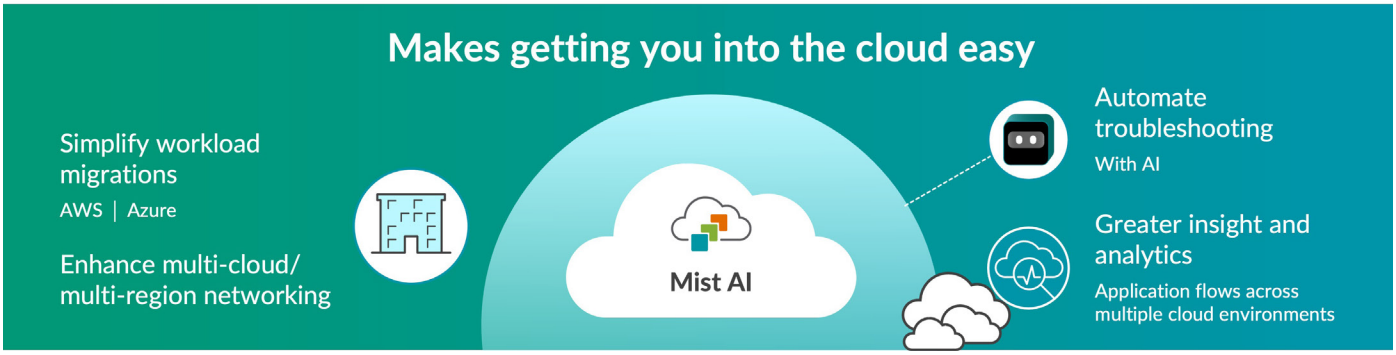

Figure 3: Admins have a single pane of glass with Mist AI cloud for improved visibility.

SSR routers are easily configured and installed in the necessary public clouds; they are then monitored via a single pane of glass with Mist AI. Mist AI provides insight into performance across all connected cloud networks with dynamic packet captures, a virtual network assistant, and AI-driven recommendations to automate troubleshooting (Figure 3).

Additional key benefits of AI-Driven SD-WAN in a cloud environment are:

- **Optimal user experience:** Application prioritization, path selection, routing, and fast failover ensure optimal application delivery to users.
- **High performance:** Free of IPsec tunnel limitations, Session Smart Routers provide predictable, low latency. performance and maximum throughput. Data transfer costs can be reduced by 30% or more.
- **Consistent policies:** IT can set global end-to-end segmentation, global encryption, and policy-based routing policies.
- **Share services:** SSR routers can interoperate with Juniper Networks® vSRX Virtual Firewall or other firewalls.
- **Visibility and analytics:** SSR routers deliver control, visibility and insights, along with end-to-end monitoring and troubleshooting.
- **Security:** Secure cloud networking comes from session-oriented and policy-driven deny-by-default access, and includes many other firewall and advanced security features.

Secure Cloud Networking

AI-Driven SD-WAN has built-in capabilities to provide sophisticated security services from every router in the network. The uniform security posture managed via the Juniper Mist Cloud platform and delivered via the SSR router includes deny-by-default access based on application policies that ensure zero-trust access control to the networking fabric.

The Juniper AI-driven SD-WAN solution puts organizations in control of session directionality and allows for full encryption of all data in motion. The Juniper Session Smart Router's Advanced Security Pack is available for adding security functionality into the routing fabric. The pack provides:

- URL filtering to prevent access to and from specific sites and to meet special business requirements
- IDS/IPS to protect against advanced malicious attacks

These features, which provide enhanced functionality within the Juniper Mist ecosystem of wired, wireless, and SD-WAN, eliminate the need for additional security appliances. If more cloud-integrated security is needed, or if the enterprise is building a SASE architecture, customers can add Juniper Secure Edge to the environment or solutions from other third-party Secure Service Edge (SSE) providers.

Advanced Networking in the Cloud with SVR

As WAN technology adapts to the cloud era, a much higher percentage of total traffic is delivered over the Internet. Traditional SD-WAN overlays add up to 130 bytes per packet, which has these additional negative effects:

- Severe impact to available bandwidth in both directions
- 30% to 50% overhead due to headers
- Tunnel management that requires tuning
- Centralized analytics constantly transmitted or completely unavailable

High-performance cloud networking with SVR corrects these problems and enhances application performance with superior throughput in cloud environments. Performance improvements are immediate and dramatic.

Using SVR, only the first packet in a session contains metadata with context; this is embedded in the payload (Figure 4).

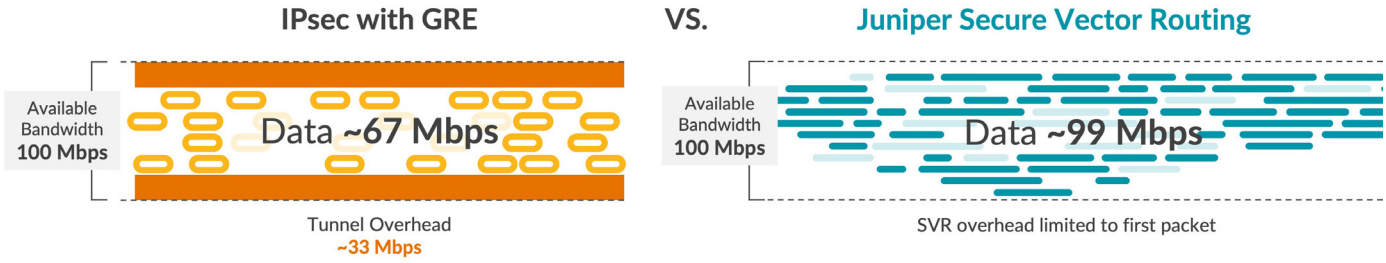

Figure 4: Bandwidth utilization is improved with SVR

Subsequent SVR packets may or may not include mid-flow session data as needed; original packets are restored at egress.

Metadata information includes the desired applications for the client and all associated devices. The original source and destination addresses are maintained, along with all the policies and controls that influence the session. The metadata ensures that all traffic will stay with the Session Smart Networking fabric, and will be forwarded symmetrically in both directions.

The benefits of this approach are:

- Minimal impact to available bandwidth
- Recovery of 30% to 50% overhead
- Optimized adjacency management
- Highest service guarantees with assured path symmetry
- Distributed analytics can be post-processed and accessed on demand

SVR also includes an adaptive encryption feature that recognizes when traffic is already encrypted and ensures that the user experience is not sacrificed as a result of needless double encryption and overhead.

Moving to the Cloud

The ability to easily migrate users and applications to the cloud is built into the AI-Driven SD-WAN solution. Supported public-cloud environments include all the cloud titans (links are to marketplace availability):

- Amazon Web Services (AWS)
- Google Cloud Platform
- Microsoft Azure

The availability of AI-Driven SD-WAN in these environments greatly simplifies the process of migrating to the cloud. Communication between regions or clouds is simplified as AI-Driven SD-WAN handles the routing, and operators enjoy greater insights into their application flows across these environments.

As a result, all the segmentation, including IP addresses from the original sources of applications and user bases remain intact in the multicloud environment. This advantage alleviates many frustrating and time-consuming activities related to duplicate IP addresses in a cloud migration exercise (Figure 5).

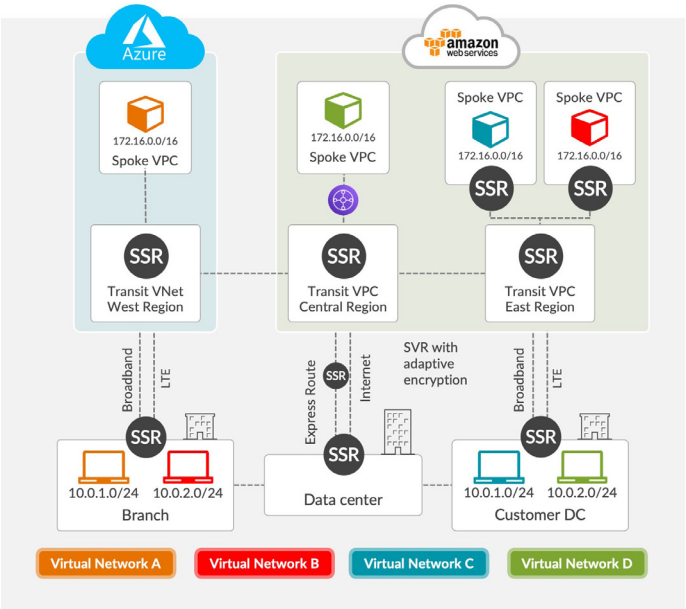

Figure 5: An AI-Driven SD-WAN accelerates deployments with intact addressing and segmentation.

Broadband connections to these cloud environments include LTE and Internet. Microsoft Azure ExpressRoute is also supported with the highest available throughput for encrypted traffic. For more information on workload migration among these different environments, see Cloud Migration and Datacenter Interconnect with Session Smart Routing.

These simplified operations across virtual network boundaries ensure global end-to-end segmentation in multitenant networks. All spoke virtual networks are intact across cloud providers.

Optimizing Software as a Service (SaaS)

Juniper AI-Driven SD-WAN quickly enables SaaS workloads including Microsoft Office 365 and Teams, Salesforce.com, and many others. A preloaded and growing list of applications and application categories allows administrators to rapidly create and apply policies for performance and security. The solution enables a simple setup and a high-quality experience.

Optimizing and routing SaaS traffic to the closest service endpoints with the least amount of latency results in optimal end-user experience and is key to the success of workforce productivity. Session Smart Networking adheres to these key networking constructs and follows SaaS network connectivity principles to ensure that any SSR router will efficiently and intelligently:

- Identify SaaS network traffic
- Allow any local branch egress of SaaS traffic to the Internet from each location where users connect to SaaS applications
- Allow SaaS traffic to bypass proxies and packet inspection devices
- Prioritize SaaS traffic to avoid congestion

Telecom Italia Mobile Brazil Optimizes Cloud Migration and SaaS

TIM Brazil, the largest telecommunications company in Brazil, was the country's first operator to migrate all its data centers to a multicloud environment using a SSR router-based network fabric. During the project, TIM employed all the use cases discussed in this brief: migrating to the cloud (or multiple clouds), networking within the cloud, and optimizing SaaS applications.

TIM faced a short timeline for the multicloud migration. The team had only a few months to move all Microsoft Office and Oracle-based applications, data, and business processes from legacy technologies to the cloud. Altogether, TIM migrated 7,000 servers, 35,000 cores, 1,200 databases, and 15 petabytes of storage from private infrastructure to a mix of public cloud services.

The SSR router-based SD-WAN platform allowed the team to shift applications while maintaining its current IP addressing scheme, accelerating the migration of more than 180 VLANs and 7,000 servers. Session Smart Networking helps maintain business continuity for cloud-based and on-premises applications, with sub-second failover between the environments and zero-trust security. With the migration complete, TIM Brazil is enjoying much higher performance networking and optimized performance from Oracle Cloud.

Conclusion

Organizations need to grow and manage their global computing infrastructures rapidly and efficiently while managing expenses and providing superior end-user experiences. While cloud migration is essential for the pace of business, it also introduces issues in the areas of security, scale, performance and ultimately cost.

With Mist AI managing SSR routers, AI-Driven SD-WAN addresses these problems while providing the perfect complement to an assortment of cloud deployments. It enables organizations to rapidly connect different cloud infrastructures while providing consistent security, superior agility, improved performance, and lower costs.

On-demand elastic infrastructure can enable organizations to save costs and scale rapidly. Using SSR routers and Mist AI makes the process seamless and provides a consistent solution across multiclouds.

Next Steps

To learn more about how Juniper's AI-driven SD-WAN solution can help you master the multicloud approach, contact your Juniper representative and go to www.juniper.net/us/en/solutions/sd-wan.html.

Resources

Web Pages

- Session Smart Router
- Secure Vector Routing
- AI-driven SD-WAN
- Mist WAN Assurance
- Mist AI and Cloud
- Marvis Virtual Network Assistant
- Public Cloud Partnerships

Solution Briefs

- From SD-WAN to the AI-driven SD-WAN
- AI-Driven SD-WAN Secures Today's Cloud Era Networks
- AI-Driven SD-WAN: Building Networks with Security at their Core
- Cloud Migration and DCI with SSR
- Optimizing Microsoft 365
- Building a Secure AI-Driven SD-Branch

Case Studies

- TIM Brazil Simplifies Cloud Migration

Webinars

- Multicloud Networking: Connecting and Securing the Future

White Papers

- Client-to-Cloud Assurance with an AI-driven Enterprise
- Session Smart Routing - How it Works

Data Sheets

- SSR100 Line of Routers
- SSR1000 Line of Routers

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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