

AI Hype vs AI-Native Reality in Enterprise Networking



Introduction

Let's start with a quick thought experiment: Imagine a few similar-looking athletes lined up at the starting line of a marathon, and it's important that you correctly guess who's going to win. Although all the runners appear fit and are making bold claims, you know little about their training regimens. However, you do know that one athlete may possess exceptional abilities and has years of experience with fine-tuning a next-generation training methodology. In contrast, the others have stuck to conventional approaches and are only beginning to adopt aspects of the new method. Which one would you choose as the winner? Without knowing more about the runners and their training strategies, you can only hope luck is on your side.

This scenario mirrors the challenge you face when upgrading your enterprise network while sorting through the various artificial intelligence (AI) and machine learning (ML) claims that vendors are pushing into the marketplace. Unless you have full visibility into their AI strategy, training model, and long-term approach, it's hard to know which one can truly deliver.

Digital transformation requires a modern network architecture that is scalable and agile—delivering exceptional mobile experiences and operational efficiency to address increasingly complex network infrastructures. By using AI and ML, organizations can significantly simplify and optimize network operations.

Juniper's AI-Native Networking Platform covers two different application use cases. It can be used in the classic AIOps (artificial intelligence for IT operations) context (AI for Networking) in the campus and branch. It also provides an efficient foundation for AI and ML workloads (Networking for AI) in the data center. When evaluating enterprise networking vendors, consider their AI strategy, model for continuous learning, and roadmap for AI integration across the full stack.

This ebook pulls back the curtain on AI in networking to help you distinguish between hype and reality. We'll discuss different AI networking strategies and help you discern between exaggerated AI claims and tangible benefits that simplify and reduce operational costs to run the network and deliver better end user experiences. By the conclusion, you'll possess the knowledge required to make informed decisions about how to best leverage AI and ML for advancing your network and your business.

Uncovering breakthrough AI deployment opportunities

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When wireless LAN (WLAN) controllers were created over two decades ago, smartphones, tablets, Internet of Things (IoT) devices, and cloud apps were barely a flicker on the radar. While the controller architecture was great for managing yesterday's networks of access points (APs), where wireless clients were limited and connectivity was a convenience, they are not equipped for the modern era of networking demands and requirements.

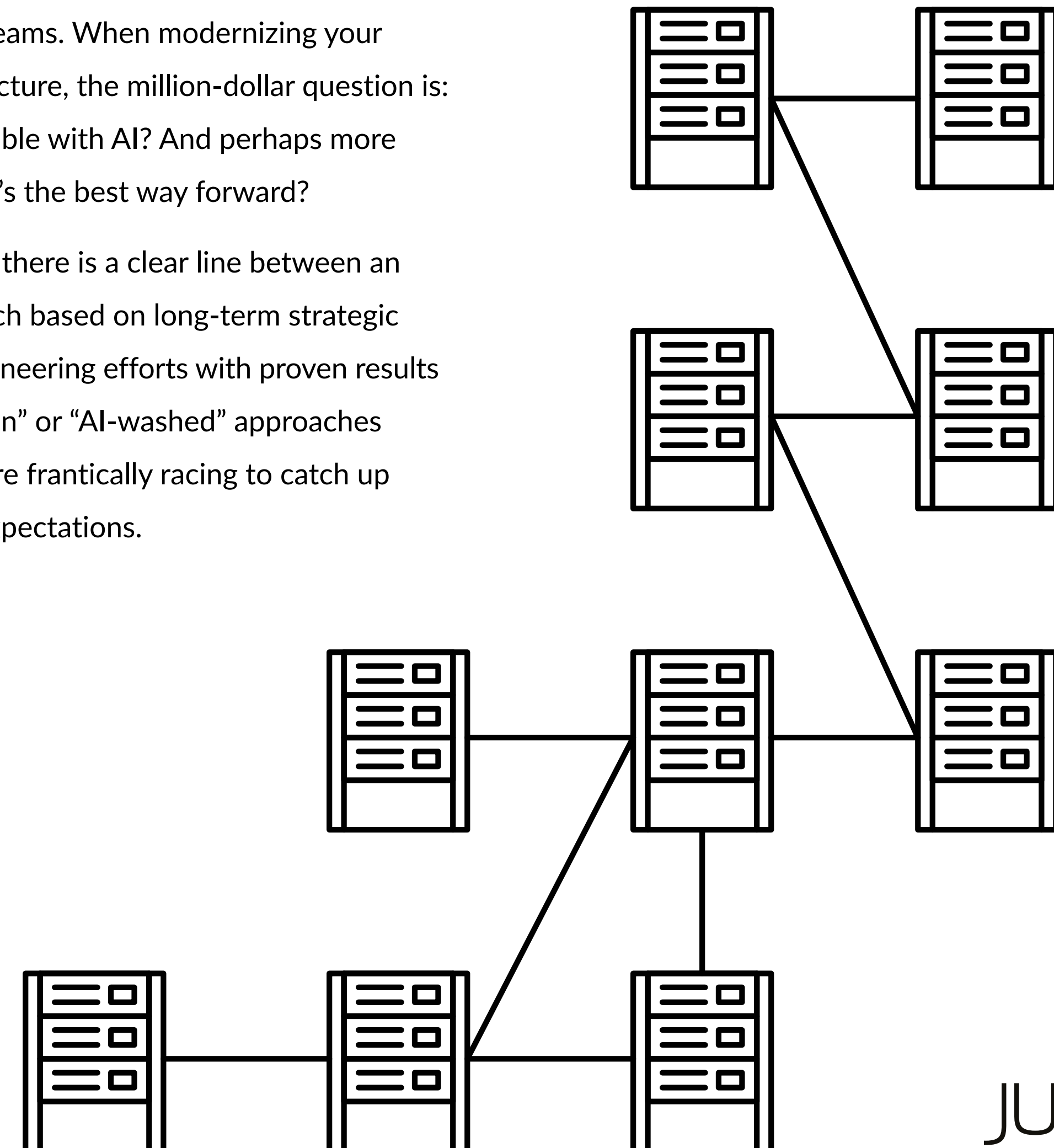
Today, generative AI models and ML are disrupting traditional technologies—from search and content creation to automation and problem solving.

And they are reshaping expectations about what's possible. As AI adoption accelerates and computing demands increase, full stack AI optimizations across various domains have moved from sci-fi fantasy to suddenly being an exciting possibility.


Among the possibilities, networking stands out as an optimal application for deploying AI in enterprises. It offers high-impact, low-risk use cases that can significantly enhance user experiences and operational

efficiency for IT teams. When modernizing your network infrastructure, the million-dollar question is: What's truly possible with AI? And perhaps more importantly, what's the best way forward?

The reality is that there is a clear line between an AI-Native approach based on long-term strategic foresight and engineering efforts with proven results versus the “bolt-on” or “AI-washed” approaches of vendors who are frantically racing to catch up to marketplace expectations.




The networking optimization imperative



1-hour outage in distribution centers

= \$35 million in lost revenue


— Amazon



30 seconds of lost visibility

= a patient wanders out the door

— Veterans Administration



If the district network is down

13,400 students can't take the test

— Coppell Independent School District

The networking industry has long prioritized connectivity and simply keeping the network up and operational. Juniper’s AI-Native approach offers a paradigm shift that prioritizes user experiences and connection quality between people, systems, and devices. A single glitchy Zoom call clearly illustrates the difference between a mere connection and a quality experience.

Today, complexity is intrinsic and a major challenge in enterprise networks. Just consider that 73% of respondents to a recent [Enterprise Strategy Group survey](#) indicated that their network has become more complex than it was two years ago.¹

This complexity comes from the requirement to support everything—from growing numbers of users and devices to multiple data centers to campus, branch, and edge locations to a myriad of hybrid, private, and public clouds. Not to mention the need to provide secure, high-performance access to a variety of devices from anywhere—all while supporting a rapidly evolving ecosystem of users, applications, and services.

Most network operations teams struggle to keep up with dynamic organizational requirements, lifecycle management, and ongoing network issues. Traditional siloed monitoring and management tools can’t provide clear end-to-end visibility into client connections or critical network events, and they burden IT staff with alarm fatigue. Many IT teams view their network with a “house of cards” mentality, fearing that fixing one problem may simply cause another—or even crash the entire network.

The real impact of operational challenges is measured by downtime, heightened security risks, and tangible costs to the business, from expensive consulting services and an overworked IT staff.

73% say their network is more complex than it was two years ago.

— Enterprise Strategy Group survey

¹AI-Native Requirements for Modern Networks, Enterprise Strategy Group, January 2024.

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A beacon of hope for overcoming complexity

This is where the effective use of AI and ML offers hope by addressing both the complexity of networks and outdated controller-based or monolithic cloud architectures.

By enabling predictive maintenance, proactive problem solving, and supporting the seamless integration of new technologies, AI and ML can transform complexity into simplicity and deliver outstanding experiences for users and IT teams alike.

The value of AI and ML-driven automation in this context is critical as it streamlines repetitive tasks, reduces human error, and frees IT staff to focus on more strategic initiatives.

But AI and ML aren't a panacea. The key to unlocking their potential is engineering foresight—an approach that begins with AI and ML as its foundation. This includes a holistic approach and designing hardware and software components to leverage the full portfolio, thus optimizing operations across the full stack.

It's about integrating AI and ML—not as an afterthought, but as an integral part of the network's architecture capable of addressing current and future operational challenges.

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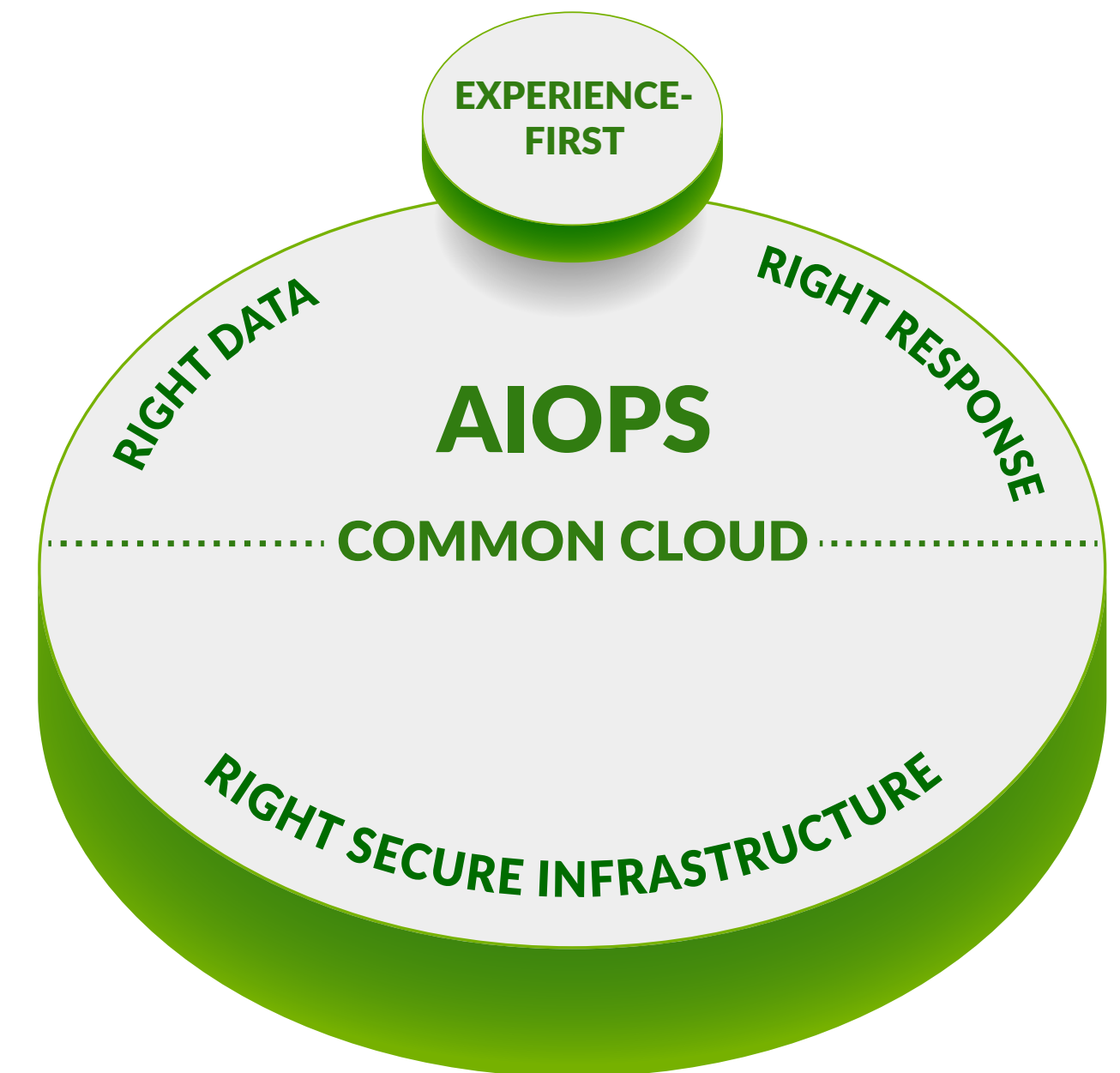
An AI-Native approach starts with taking a step back and asking tough, big-picture questions about how to address critical networking challenges. Questions like:

- How do we ensure every user in every location is getting a great and consistent experience?
- Can the network adapt to fix issues before users even know they exist?
- How do we get services up and running flawlessly and quickly?
- How do we optimize Day 2 operations and reduce firefighting to free up teams to work on strategic business problems?
- Can we simply and seamlessly adopt a Zero Trust posture everywhere in the network?
- Can we quickly discover and neutralize threats to minimize their impact on the business?
- Is the network agile enough to cost effectively support changing business requirements?
- Does the network meet the needs of all necessary stakeholders?

Answering questions like these not only requires innovative capabilities delivered by AI and ML, it also requires a concerted effort across the full network stack—from operating systems to hardware to software—to start designing technology that can provide visibility and orchestrate actions in unprecedented ways.

It also requires comprehensive insights with AI models that continuously improve themselves, trained on the context of anomaly detection, service levels, and event correlation.

It's a holistic combination of the right data, the right real-time response, and the right secure infrastructure. And that's not something that you can build out on short notice in response to rapidly shifting marketplace trends and expectations. It takes years of effort.



AI-Native Networking is a holistic combination of the right data, the right real-time response, and the right secure infrastructure.

Putting the importance of long-term vision into context

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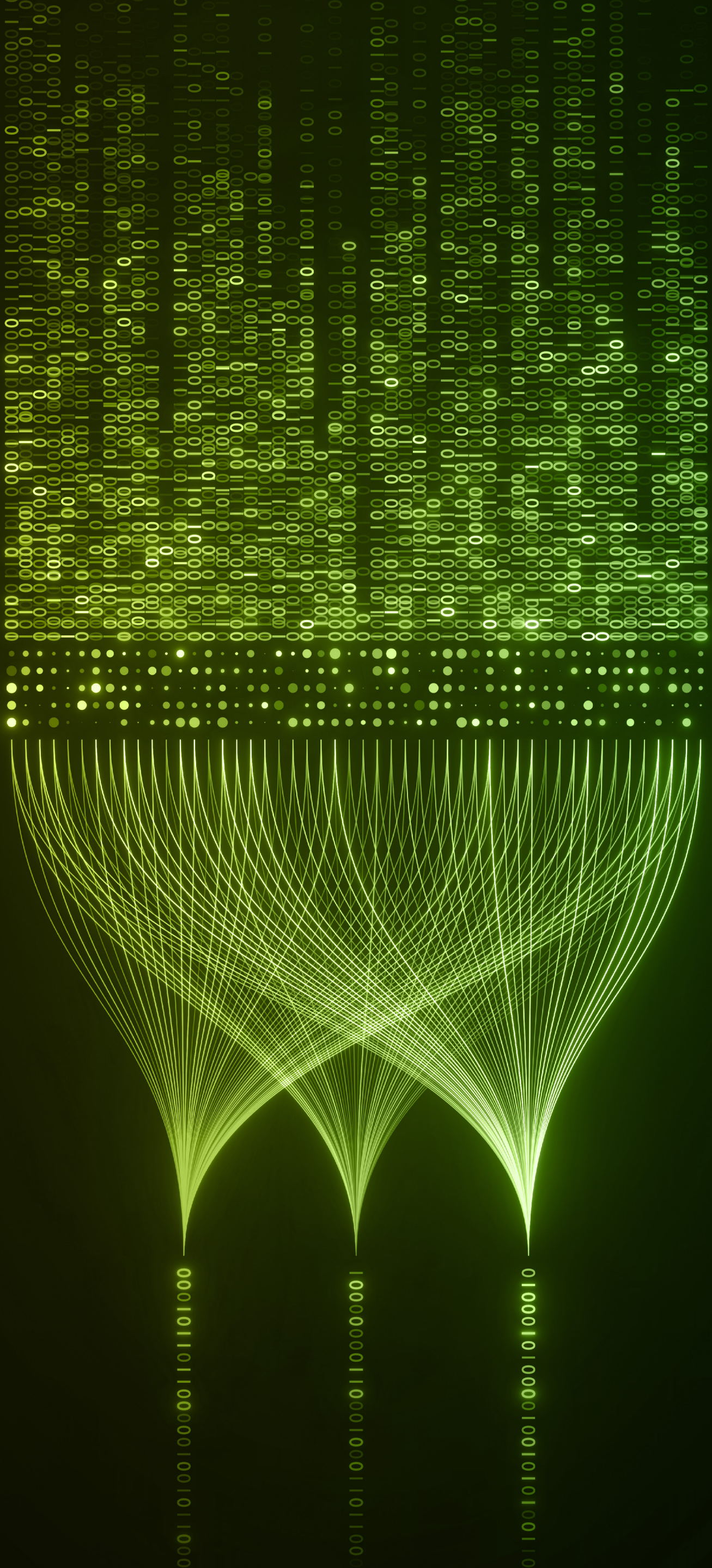
The Now Way to Network

Juniper’s hard work on our AI-Native Networking Platform began in 2015. We’ve been training our models, feeding them high-quality data from countless customer networks, and continuing to innovate with new functions and capabilities ever since—with a focus on greater simplicity, productivity, reliability, assurance, and high performance at scale.

While other solutions provide visibility to the site or application, Juniper provides visibility all the way down to the individual client, application, and session to optimize individual user experiences. In addition, only Juniper has a common schema for applying service levels from client to cloud across the WLAN, LAN, WAN, and data center.

To understand what this head start of over nine years means, you simply need to look at Juniper’s AI-Native capabilities, how they are built into solutions, and the significance of the results they deliver.

Juniper provides visibility all the way down to the individual client, application, and session to optimize user experiences.



Hype vs reality: AI-Native, bolt-on AI, and AI washing

For automation, insight, and AI-driven actions to deliver maximum results from clients all the way through to the cloud (or several clouds), they must be coordinated. Unlike the alternatives, AI-Native capabilities support cohesive operations and experiences across your enterprise network.

A modern microservices cloud architecture in Mist AI delivers true visibility, automation, and assurance across the WLAN, LAN, WAN, data center, and security domains.

	AI-Native Networking	Bolt-on AI	AI washing
Definition	Computer networking systems that are conceived and developed with AI integration as a core component to enable simpler operations, increased productivity, and reliable performance at scale	The inclusion of AI into existing networking solutions as part of ongoing efforts to improve performance or add new features	Solutions marketed as AI-powered, but without substantial AI functionality that are aiming to capitalize on marketplace trends
Architecture	Controller-free, microservices cloud architecture with open APIs	Controller-based, monolithic software architectures (mixed portfolios)	Beginning to use microservices for specific applications such as “splash pages”
Resiliency	Microservice containerization ensures that the failure of one service does not impact others and that the network remains running if the cloud connection goes down	Complex architecture with redundant virtual controllers, mobility masters, and compatibility matrixes	Controllers and hypervisors
Agility	Rapid updates without network disruption	<ul style="list-style-type: none">• Monolithic (brittle) software with poor ability to update for new devices/apps/fixes• Multiple servers that all need right code versions• High risk to update	Slow updates or scheduled downtimes that last for hours
Interface	A common AI engine and groundbreaking Virtual Network Assistant (VNA) with self-driving capabilities and AI-Native support across wired, wireless, and WAN streamlines operations so you can go from reactive troubleshooting to proactive remediation	Reliance on dashboards, support chatbots, and early version of NLP for common issues, requiring reactive manual investigations to find and resolve issues	Requires several days of tuning and manual, static configuration of features: <ul style="list-style-type: none">• Dashboard and network assistant only on cloud• No AI• No query
Deployment flexibility and cloud management	<ul style="list-style-type: none">• Scales from the smallest to largest enterprise businesses for rapid updates• Single-click activation for streamlined rollouts• Wired, Wi-Fi, and WAN Assurance for full lifecycle management	<ul style="list-style-type: none">• On-premises with no cloud offering for software-defined access• Controllers and cloud lack parity, are complex to manage, and have limited to no visibility into client performance	<ul style="list-style-type: none">• Virtual controllers hosted in co-located data centers

Seeing the AI-Native Networking advantages

Now that you're versed in AI-Native Networking and how it's differentiated from other approaches, the question remains: How does AI-Native translate into exceptional experiences and real-world value in the campus, branch, and beyond?

AIOps

At Juniper, our unique AIOps approach serves as the core of our AI-Native Networking Platform. Using real-time data from a variety of sources, including access points, switches, routers, and firewalls, our AIOps continuously refines performance and security across every aspect of your network:

- Wireless and wired access
- Campus network core
- SD-WAN
- Data center
- Security
- Indoor location services

Self-detecting

Up to

90%

fewer trouble tickets

Self-healing

Up to

85%

fewer truck rolls

Self-configuring

Up to

9x

faster to deploy

Our data scientists design AI Primitives that underpin our AI toolkits, starting from the experience-focused types of questions highlighted above. These toolkits are constantly enhanced through real-time telemetry data from across the entire IT infrastructure in real time or near real time. Network performance is continuously monitored and analyzed with automatic adjustments to optimize speed, reliability, and efficiency. By predicting network failures and bottlenecks before they occur, AIOps can take preventative maintenance measures to reduce downtime—a practice we've been refining since the beginning, over nine years ago.

The focus on AI-powered innovation is so central to our mission that it directly influences our organizational structure, ensuring optimal allocation and utilization of AI resources. We also adhere to a set of [AI Innovation Principles](#) that are designed to ensure that we are transparent in our use of AI and that our solutions are mission driven and explainable.

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Marvis shifts teams from reacting to trouble tickets to proactively identifying and resolving issues.

Meet Marvis, the first AI-Native Virtual Network Assistant

Beyond AIOps, the Marvis Virtual Network Assistant (VNA) is another unique Juniper innovation that transforms how IT teams interact with their enterprise networks.

Since 2017, Juniper has been refining and adding to the capabilities of Marvis to help IT teams shift from constantly reacting to trouble tickets and bug fixes to proactive issue identification and resolution.

Marvis constantly ingests data, learning from network devices and applications in support of simplified workflows and network optimization. Some of the breakthroughs include the following:

Conversational assistance: Through a conversational interface that uses natural language processing and understanding (NLP, NLU), large language models (LLM), and generative AI, IT teams can interact with the network to understand what's happening and get specific answers regarding how to best address issues surfaced by our AIOps.

Proactive issue identification: Juniper introduced the industry's first AI-Native Networking Digital Experience Twins: Marvis Minis. Minis use unsupervised ML to proactively simulate user connections to instantly validate network configurations to find, detect, and fix problems across networks without users having to submit a trouble ticket. They also feed data back to the AI engine in support of ongoing model enrichment. Marvis Minis come standard with Marvis and don't require any additional hardware, software, or subscriptions.

Proactive actions: Marvis can also identify and resolve the root cause of many network issues across WLAN, LAN, WAN, and security domains through proactive actions (for example, identifying and addressing firmware issues, missing VLANs, or congested WAN circuits, or validating that human-initiated actions have the intended results).

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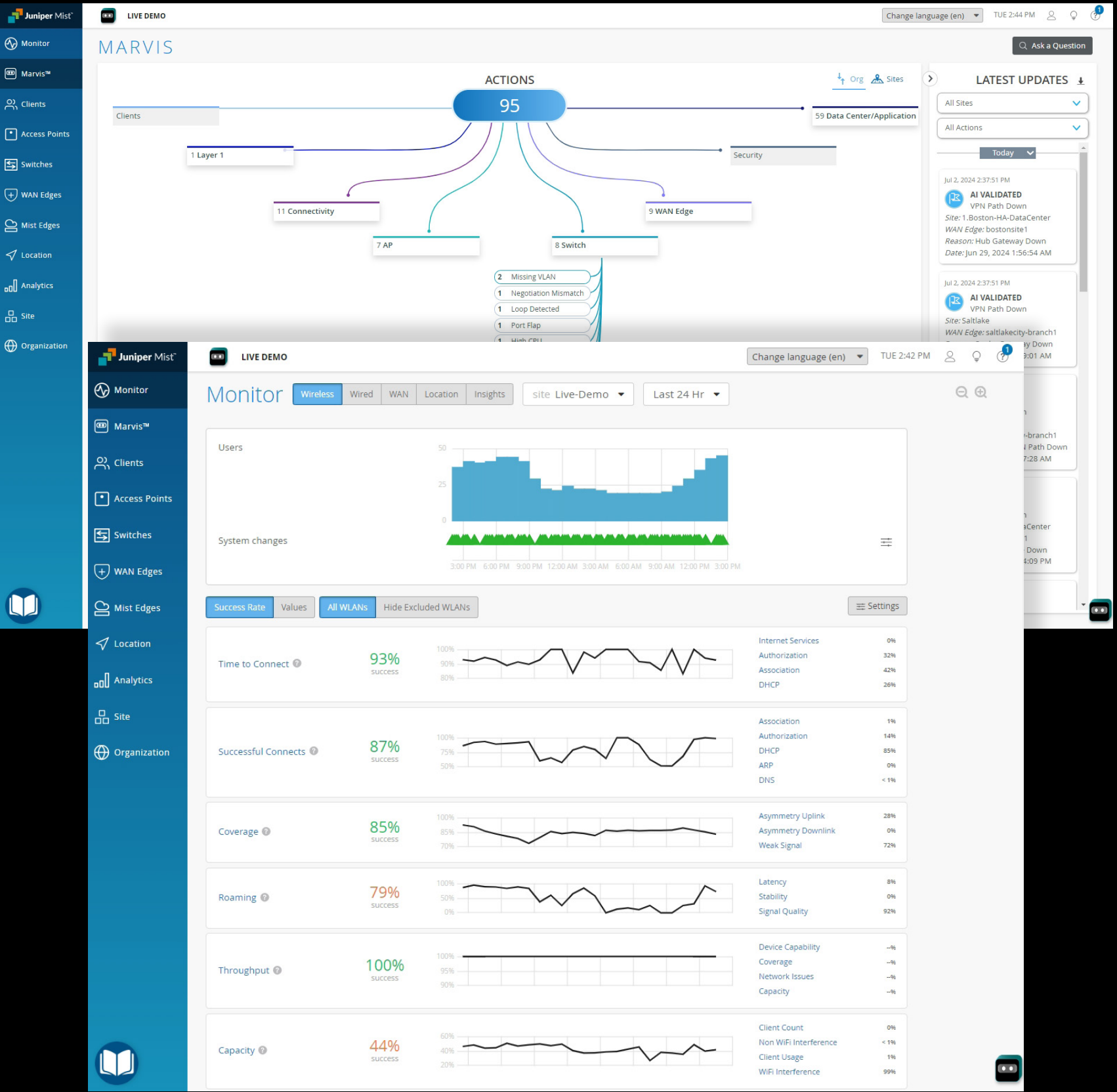
Users are demanding better connectivity, networks are supporting more devices and applications than ever, and the numbers will only continue to grow. At the same time, digital transformation pressures are reshaping networks from the data center to edge to cloud while driving exponential growth in data volumes. Even with a hodgepodge of added AI capabilities, controller-based architectures simply can't deliver the scale, resiliency, agility, and elasticity needed for today's demanding business requirements.

The future of networking demands a better way forward. AI-Native Networking is the way, and it's already driving exceptional user and IT team experiences in enterprises across the globe. Juniper's AI-Native Network is built for AI and ML from the outset. Whether an organization is using AI for the network or building an optimal network for AI, an AI-Native Networking Platform provides the flexibility, automation, and assurance needed to simplify operations, increase productivity, and deliver reliable performance at scale.

See the AI-Native advantage in action

Join our live monthly demo to see how the modern microservices cloud architecture in our AI-Native Networking Platform delivers true visibility, automation, and assurance across your network.

[Register now →](#)



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 exceptional and secure user experiences from the edge to the data center and cloud. You can find additional information at Juniper Networks (www.juniper.net) or connect with Juniper on [X](#) (Twitter), [LinkedIn](#), and [Facebook](#).



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