No Shortcuts: Building Trust on a Journey to the Self-Driving Network

How Juniper is helping unlock the potential of fully autonomous networking

Contents

Welcome to an increasingly autonomous world

Juniper's AI-Native Networking Platform builds trust at each stage of a journey to the Self-Driving Network.

Learn how →

At Juniper, we see clear parallels between the journey to self-driving cars and the Self-Driving Network™. It's a matter of trust.

Self-driving cars are poised to make our roads and highways significantly safer, more efficient, and less of a headache for humans. The Self-Driving Network represents a similar opportunity, giving you a fully autonomous network capable of proactively optimizing network performance without human intervention.

Increasingly complex network environments must support a continually growing number of devices and data-intensive applications, making time-consuming manual network management a major challenge. Yesterday's network inhibits progress, negatively impacts network experience, and ultimately stifles innovation. Like a Model T from yesteryear, traditional network management simply can't keep up with the growing needs of speed, scale, and security requirements for today's modern world.

But all of that is about to change. The ultimate networking destination is a fully autonomous network that:

- Anticipates and proactively resolves issues
- Reduces the operational burden on your IT team
- Mitigates the potential for human error
- Minimizes network downtime
- Optimizes bandwidth, latency, and load distribution in real time
- Automatically scales up or down based on demand
- Adapts to increasingly complex requirements
- Identifies and mitigates security threats as they happen
- Significantly lowers operational costs
- Ensures better user and operator experiences

Although the benefits of a fully autonomous network are clear, gaining the trust of operators and users can be easier said than done. This ebook will identify those adoption challenges while outlining what a journey to the Self-Driving Network entails and the rewards it delivers to your organization every step of the way.

Key takeaways

What once seemed like science fiction—a fully autonomous, self-driving network—is now rapidly coming within reach through relentless innovation and by iteratively earning the trust of operators, end users, and business leaders.

01

AI is rapidly becoming a baseline requirement

From networking to GenAI to ecommerce, AI is now the name of the game.

02

Network complexity is stifling innovation

Manual operations shift your team's focus away from strategic innovation.

03

AI in networking represents a competitive advantage

Whether or not you seize the AI opportunity ahead, your competition surely will.

04

Good data is at the core of AI success

Without access to the right quality and quantity of data, AI is a hollow promise.

05

AI adoption requires organizational trust

As with any new technology—from cloud to Agentic AI—trust is key to adoption.

06

Trust is built through a series of iterative successes

Once people experience the benefits, their doubts quickly fall to the side.

“Trust is hard to earn, easy to lose, and difficult to reestablish.”

Anonymous

03 Building trust

Building trust in AI doesn't happen overnight

Just a few years ago, no one would have climbed into the backseat of a driverless taxi. Today, it's quickly becoming a popular way to get home from the airport.

This shift in sentiment toward driverless taxis is only a reality because of the incrementally larger role AI has played at each stage of development, building people's trust over time and through iterative successes. From pure fantasy to daily driver, we've seen this evolution quickly play out over the last few years in the automotive world.

In networking, the fear and skepticism around letting AI take the wheel is the result of mistrust and misunderstanding of the technology. Much of that is due to the practice of "AI washing"—when vendors imply their product or service is AI-driven when AI's role is tenuous, absent, or simply bolted on to an existing solution. Too often, networking is marketed as AI-driven without offering substantial AI or ML functionality, aiming to capitalize on market demand and tech trends without following through on the actual innovation.

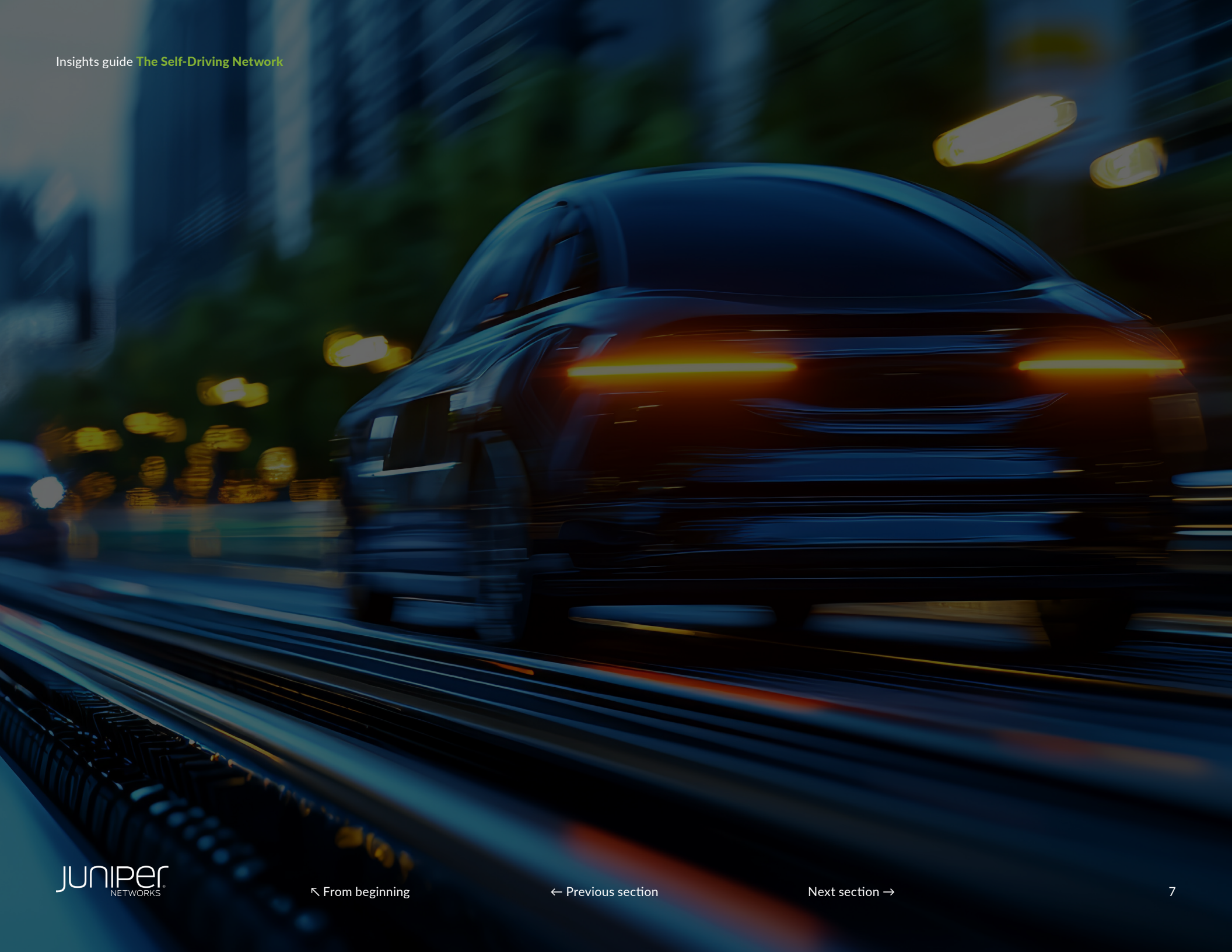
Put simply, there are no shortcuts to trustworthy AI. Think of it as a journey—one where every iterative win proves value, builds trust, and gives users the ability to boldly move forward with confidence.

To separate AI hype from true AI, it's important to ask the following:

- **Is the AI transparent?** Does the vendor have explainable AI? And can they show you how the AI continuously improves over time? You can't trust what you can't see.
- **Do they have good data?** And how long have they been collecting that data? At its core, even the best AI application is just an empty shell of potential without the right data to fuel it.
- **Does the vendor use its own AI?** If your vendor doesn't trust its AI solutions enough to use them internally, why should you? Hint: You shouldn't.
- **Where's the proof?** Real AI is measured by outcomes, not marketing jargon. You can't afford to be someone's AI guinea pig. Look for battle-tested, proven solutions you can trust.

Once the journey to trusting AI is initiated, the next step is cultivating comfort with its daily application. The more your organization experiences AI delivering real-world results, the more you'll want to embrace the technology and rely on it to scale your efficiency, productivity, and strategic value.

The hard work on Juniper Networks' AI-Native Networking Platform began in 2014. We've been training our AI models, feeding them high-quality data, and developing additional capabilities—with a focus on greater simplicity, productivity, reliability, assurance, and high performance at scale—for over a decade. That's far longer than any other networking vendor.



04 The Self-Driving Network

Defining your journey to the Self-Driving Network

Autonomous networking has the potential to eliminate manual troubleshooting and ensure secure and flawless connectivity without the need for human intervention. But how do you get there safely in one piece?

A journey to the Self-Driving Network is a five-stage journey that rapidly builds confidence in AI as the models become more and more sophisticated. With growing confidence and trust, the AI is allowed to increasingly automate routine tasks—from resolving performance issues to optimizing operations—before ultimately achieving full autonomy.

At each progressive stage of the journey, expect the following:

01 High-quality, relevant **data** is collected

02 The AI translates data into useful **insights**

03 The AI prioritizes issues, **recommends** fixes

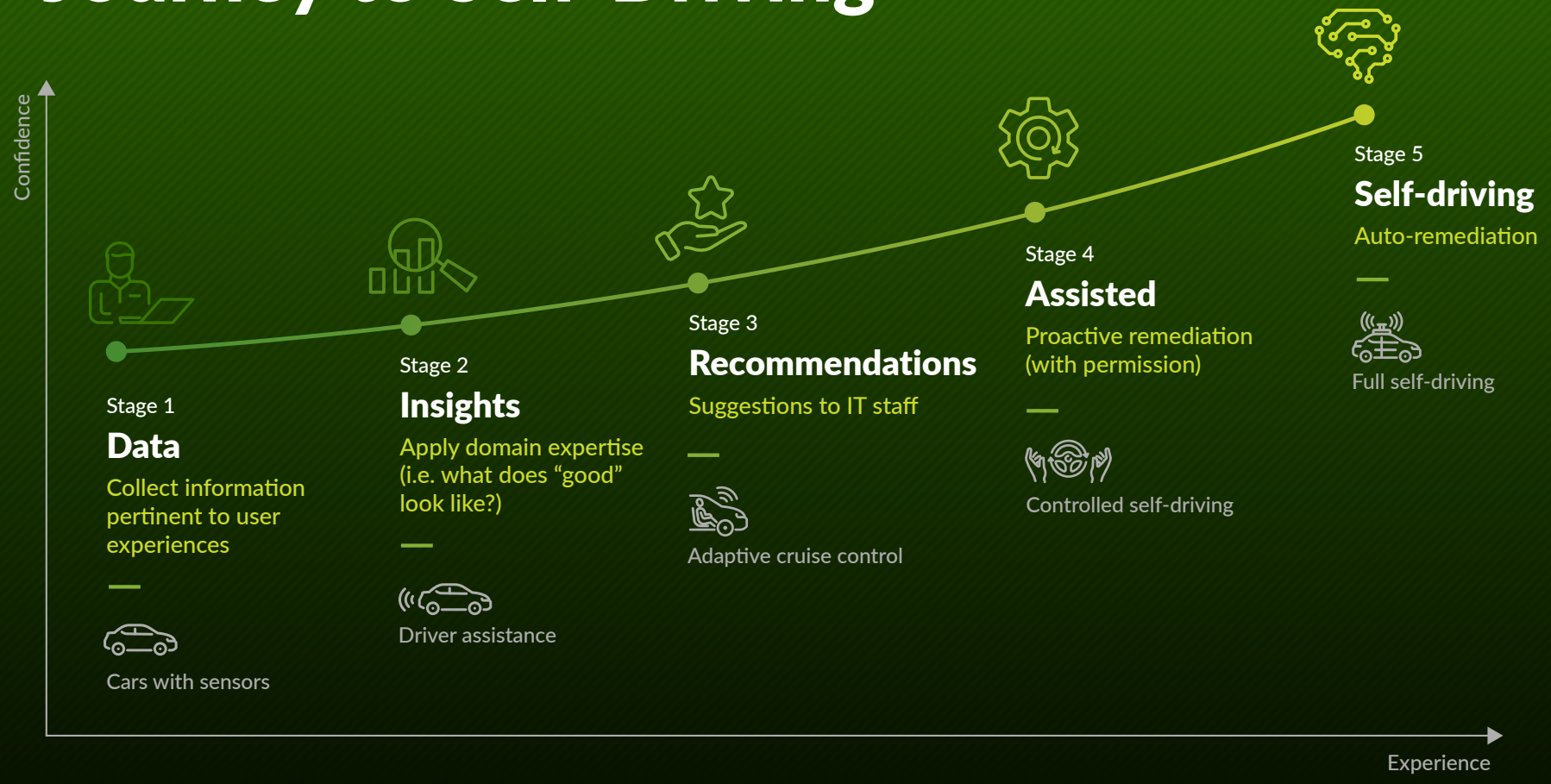
04 With permission, the AI **automates resolutions**

05 The network operates with **full autonomy**

For over a decade, Juniper has thoughtfully and deliberately added autonomous capabilities to our AI-Native Networking Platform. It's the first and only solution designed to help you harness the power of AI while gradually advancing along this transformative path of trust.

The Self-Driving Network is positioned to redefine what's possible in networking—empowering IT teams to drive innovation, scale seamlessly, and deliver exceptional user experiences.

Journey to Self-Driving



05 Data

Stage 1: High-quality, relevant data is collected

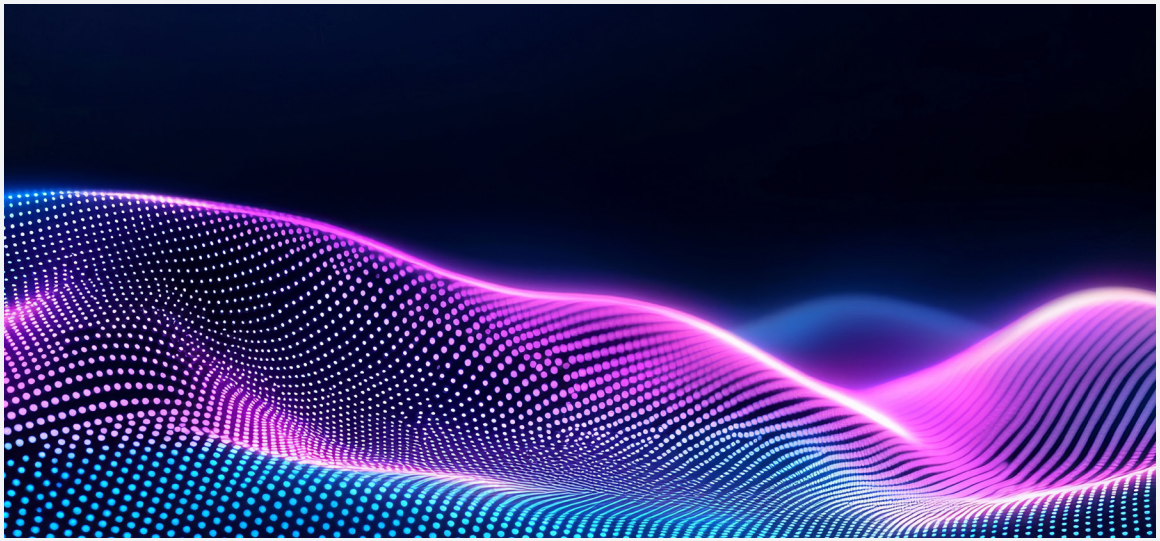
The first stage on a journey to the Self-Driving Network is all about collecting the right types of high-quality data.

In a typical modern car, data is collected through a variety of sensors, tracking things like vehicle speed, surrounding obstacles, and road conditions. Although this data collection may be invisible to the driver, trust is built as new safety and efficiency features are realized and put into action.

In networking, collecting large amounts of the right data and determining which data is most relevant for training and informing AI algorithms is critical to enabling each successive stage of the Self-Driving Network journey.

Juniper has been collecting the right data from access points (APs), routers, switches, and firewalls for over a decade. For example, over 150 real-time wireless user states are measured through streaming telemetry from APs. Open APIs enable us to collect even more data from third-party applications. This data, centralized in the cloud, is the foundation for developing advanced AI algorithms that deliver insights, recommendations, and self-healing capabilities.

Determining which data is relevant for training and informing AI algorithms requires deep networking domain expertise and experience. It's also why our customer success teams collaborate so closely with our data scientists and your IT team to understand (and help you solve) your most pressing challenges.



"Juniper Mist allows us, through its analytics, to find out where our problems are, and even if only 2% of users are having a problem, we can resolve it on the fly."

Mitch Davis CTO, Dartmouth College

06 Insights

Stage 2: The AI translates data into useful insights

Stage two of five on a journey to the Self-Driving Network is focused on transforming data into actionable insights.

In modern automobiles, data is transformed into real-time insights to proactively alert drivers to risk, helping them avoid collisions and arrive safely at their destination. Building trust in something like a back-up camera requires the driver to replace their built-in habit (looking backwards) with what might initially seem like counter-intuitive behavior (looking forward) when backing into a parking space.

The shift in networking is similar, allowing operators to now see so many things they would have otherwise missed. When relevant data is translated into useful insights, IT teams quickly gain visibility and context into network performance. They're able to proactively address issues, enabling their teams to spend time on more complex challenges.

Juniper Mist AI provides insights into user experiences and identifies the root cause before network performance degrades. For example, if a metric like throughput, capacity, or signal strength falls below a certain threshold, the root cause is quickly identified, along with context for how it's qualitatively impacting user experiences. This helps IT teams proactively find and resolve issues, drastically reducing troubleshooting time and allowing them to fix problems before they start.

> **"We are a small IT shop, and we needed to be nimble. We needed a network that can tell us when there are problems and guide us through day-to-day operations."**

Scott Marrone IT Director, City of Parkland, Florida

07 Recommendations

Stage 3: The AI prioritizes issues, recommends fixes

This stage on a journey to the Self-Driving Network is where operators, users, and the organization build trust in AI-Native recommendations.

Trust here is guickly gained because the outcome of heeding the recommendation is typically immediately positive—and the impact of ignoring the alerts on insurance rates unacceptable.

In networking, AI-Native recommendations take data-driven insights to the next level by offering actionable suggestions to improve network performance. They help IT operators quickly prioritize issues while also providing intelligent suggestions on how to quickly and proactively resolve them.

For example, Marvis Virtual Network Assistant, powered by Mist AI, is unparalleled in its ability to identify root causes and provide recommend resolutions for nearly any network issue, such as firmware problems, missing VLANs, and congested circuits. Meanwhile, Marvis Actions flags the most critical performance issues across the network, helping IT teams accurately and intuitively prioritize where they should focus their attention.

It's like having a team of virtual networking experts working 24/7, focused on ensuring your network's uptime and optimal performance.

> **"We can predict potential issues before they happen. Mist AI automatically detects issues and proactively self-heals or sends an alert to an engineer so they exactly know where there is an issue in the network and what to fix."**

Nava Ramanan Deputy Director, U.K. Ministry of Justice

08 Assisted

Stage 4: With permission, the AI automates resolutions

At the penultimate stage on a journey to the Self-Driving Network, the network proactively assists IT teams with automated actions.

Many modern automobiles can autonomously adjust speed, make turns, and change lanes, but a driver is still required to be in the driver's seat—with sensors constantly ensuring they are fully alert and paying attention. But the driver is effectively able to take their hands off the wheel and give the car permission to guide them safely home.

At this stage in the journey, permission is required before self-healing actions can be taken by the network. This "assisted" functionality is happening today across Juniper's AI-Native Networking Platform. For example, Mist AI can initiate a port reset if it detects a connectivity issue or initiate an RMA (return material authorization) for an AP it has deemed defective.

These self-healing capabilities strengthen network reliability while further mitigating downtime and minimizing the burden on your limited IT resources. You still maintain control but have a greatly increased level of performance and efficiency.

Self-detecting

up to 90%

fewer trouble tickets

Self-healing

up to 80%

fewer truck rolls

Self-configuring

up to 9x

faster deployment time

09 Self-driving

Stage 5: The network operates with full autonomy

The fifth and final stage of a journey to the Self-Driving Network happens when you step aside and let the network run itself, redefining what's possible.

Following through with our self-driving car analogy, we've reached the point of driverless taxis. No driver, no steering wheel, no need for oversight—just a fully autonomous vehicle ready to safely whisk you off to your destination. Drivers become passengers who put their ultimate trust (their lives!) in this once-futuristic technology.

At the finish line of our Self-Driving Network journey, the network will now be capable of making decisions on its own and taking action without an operator needing to be present. From proactively identifying and resolving issues to accurately predicting user experiences and adjusting network settings based on external, real-time inputs, the network will now take on and independently resolve most operational tasks.

No more dashboards. No more manual troubleshooting. And no more networking emergencies waking you up in the middle of the night. The Self-Driving Network will seamlessly work in the background, optimizing network performance and freeing up your IT teams to focus on more strategic initiatives. Even when human interaction with the network is required, the Marvis interface will handle an operator's queries using natural language, which makes resolving problems as easy as having a conversation.

10 Under the hood

Under the AI hood of Juniper's Self-Driving Network

Trust is the foundation of AI adoption for any enterprise, and that starts with full transparency.

Our explainable AI (XAI) is at the heart of Juniper's transparent, trustworthy AI-Native Networking solutions, enhancing everything from Wi-Fi management to network anomaly detection. XAI helps explain to users, AI practitioners, and customers how our AI solutions achieve answers on par with human domain experts.

We also adhere to core innovation principles that make our AI inclusive, intentional, secure, and mission-driven. We're open about what data is collected, how it's used, where it's stored, and how it's fully secured.

Through closed-loop feedback and reinforced learning, our AI is constantly improving efficacy over time. With over 10 years of AI development and training, we've built deep domain expertise to understand exactly what data matters most in any given situation. And we're one of the only vendors to offer a microservices cloud architecture for rapid processing and unprecedented insights.

Juniper is the ONLY networking vendor that actively uses its own AIOps in customer support. Our customer success team relies daily on the same AI insights we provide to our customers. Since day one, our data science and customer success teams have worked together with our customers, uncovering common networking challenges and collaboratively developing AI tools that can rapidly detect and resolve issues without human intervention.

With the AI-Native Networking Platform delivering proactive, data-driven insights, actionable recommendations, self-healing actions, and the industry's only virtual network assistant—all backed by transparent, explainable AI—Juniper Networks continues to lead the way toward a truly autonomous, self-driving network.

An action guide for your journey to the Self-Driving Network

As you embark on the journey ahead, it's important to consider the five critical stages to building organizational trust and iteratively evolving toward a fully autonomous network.

01

Collect the data

Our data sciences and customer support teams work together to ensure we get the right data needed to solve your top issues with AI.

02

Transform data into insights

Tap into the power of Juniper Mist AI to transform your quality data into actionable insights.

03

Turn insights into recommendations

Juniper's AI-Native Networking Platform will then work to help you understand the most recommended actions based on those insights.

04

Automate resolutions

As you gain trust in the platform, allow the assisted functionality to begin automating certain resolutions—with IT oversight, but no manual intervention.

05

Take your hands off the wheel

Now it's time to trust Juniper's AI-Native network to autonomously optimize performance and universally elevate network user experiences.

Next steps

For more information and assistance in starting or continuing your journey to the Self-Driving Network, contact your Juniper account representative or explore some of the resources found at these helpful links.

Connect with an expert

Begin your journey to the Self-Driving Network.

Schedule a consultation →

Explore the journey

Dive deeper into the five-stage journey to the Self-Driving Network.

Visit site →

Read case studies

See how we help unlock new growth for Juniper customers.

Success stories →

AI-Native NOW events

Stay informed of upcoming events and watch past ones on demand.

Explore →

About the author

Jeff Aaron

Group VP Product Marketing,
Juniper Networks

Jeff is responsible for global promotion of Juniper's entire product suite across the AI-Native Networking portfolio. He has over 24 years of marketing experience in the high-tech space, having worked at various software, networking, and telecommunications companies. Jeff earned his BA from Duke University with majors in Computer Science and Economics.

Why Juniper

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, highly secure, and sustainable user experiences from the edge to the data center and cloud. Additional information can be found at juniper.net or connect with Juniper on X (formerly Twitter), LinkedIn, and Facebook.

More information

To learn more about the journey to the Self-Driving Network™, contact your Juniper representative or partner, or visit https://www.juniper.net/us/en/ai-native-networking-platform/journey-to-the-self-driving-network.html

juniper.net

© Copyright Juniper Networks Inc. 2025.
All rights reserved.

Juniper Networks Inc.
1133 Innovation Way
Sunnyvale, CA 94089

7400205-001-EN February 2025

Juniper Networks Inc., the Juniper Networks logo, juniper.net, and Product are registered trademarks of Juniper Networks Incorporated, registered in the U.S. and many regions worldwide. Other product or service names may be trademarks of Juniper Networks or other companies. This document is current as of the initial date of publication and may be changed by Juniper Networks at any time. Not all offerings are available in every country in which Juniper Networks operates.