

# MARVIS VIRTUAL NETWORK ASSISTANT

## Product Overview

The Marvis Virtual Network Assistant (VNA) is the digital network expert that supports your own team of network experts—network administrators, site reliability engineers (SREs), or anyone based in network operations centers (NOCs). Marvis is the first network assistant in the industry to bring conversational AI to networking, transforming the way IT teams interact and engage with enterprise networks.

In the era of AIOps, Marvis delivers streamlined operations, simplified troubleshooting, and remarkable user experiences. Since 2016, the Mist AI™ engine has applied various data science tools to continue to learn and improve, expanding its knowledge base as it becomes a fundamental component of The Self-Driving Network™.

## A Conversational Assistant

Conversational interfaces have come a long way to become a part of our everyday lives, evolving the way humans interact with computers—the most well-known ones being Siri, Cortana, and Alexa. They have formed an area of strategic investment across several industries, including banking, retail, and healthcare, as organizations look to streamline operations and deliver personalized experiences to users. And now, Juniper Mist™ is the first to bring a conversational interface to enterprise networking, driven by Mist AI.

Marvis enriches its natural language processing (NLP) capabilities with natural language understanding (NLU) to offer a conversational interface that understands user intent and delivers improved value and quality of returned results. The power of the Marvis conversational interface is that it can contextualize requests to accelerate troubleshooting workflows, answer product or feature specific questions, provide information about the network, and help find any type of network device. It can make recommendations to:

- Get real-time answers about the network in a few clicks
- Deduce user intent from general statements and inquiries using advanced NLP with NLU and NLG
- Improve specific user experiences by learning from user feedback
- Ask generic questions beyond troubleshooting, like “How to setup RRM?” and “Does AP have capacity?”

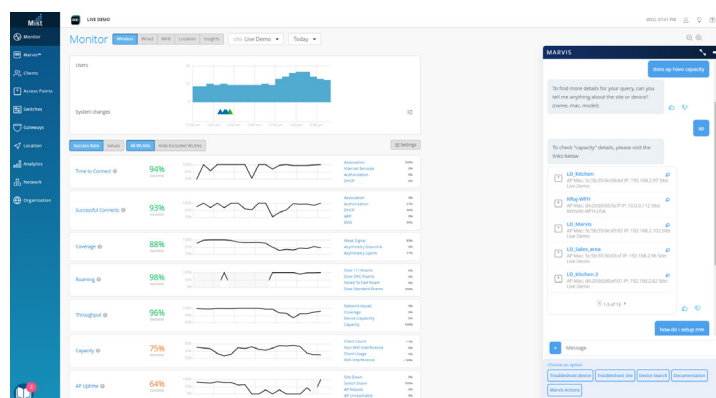


Figure 1: Marvis conversational interface

Marvis automates troubleshooting and support so IT teams can get to shorter mean time to resolution and innocence. It presents a comprehensive network view with user, client, and device insights, eliminating the need to pull up multiple dashboards or memorize CLI commands. Marvis is an extension of the IT team—it combs through data and logs to determine root causes and provides answers in real time with high efficacy.

Marvis is the one-stop shop for IT teams to understand the state of the network. They no longer have to memorize CLI commands or know which dashboards contain the relevant information. With answers at their fingertips, it significantly transforms the way IT teams experience and interact with the network.

## Client-to-Cloud View Via Actions: Journey to a Self-Driving Network

Marvis Actions is about driving operational simplicity and transforming IT from reactive troubleshooting to proactive remediation. It offers a “morning cup of coffee” view, which delivers visibility into high-impact network issues at an organizational level so that administrators know exactly what they need to prioritize and focus on for the day. As sites get added, Marvis Actions scales with ease as no additional setup is required from the user.



Fig 2: Marvis provides proactive return material authorizations

Marvis proactively identifies the root cause of issues across IT domains (WLAN, LAN, WAN, security, and applications) with high efficacy to either automatically resolve issues (self-driving mode) or recommend actions that requires user intervention (driver assist mode). Once completed, Marvis closes the feedback loop by validating that the actions are correct in the Mist AI engine, thus helping Marvis learn while gaining your IT team's trust.

For Juniper Mist™ Wired Assurance, some Marvis Actions are listed here. Marvis isolates wired clients failing to connect, and it identifies bad network cables connected to ports, mismatched port settings, L2 loops, and continuous port flaps. It also automatically adds missing VLAN tags, fixes incorrect port mode configuration, and isolates persistently failing clients. For Juniper Mist™ Wi-Fi Assurance, Marvis Actions helps track and manage firmware upgrades, isolates persistently failing clients, detects coverage holes, identifies APs connected to a bad cable, detects missing VLANs along with coverage holes and RF capacity failures, and it identifies actions required to resolve EAP/802.1X authentication failures.

Additionally, Marvis realizes our AI-driven support with proactive return material authorization (RMA) for unhealthy Juniper access points. It eliminates the manual troubleshooting

checkpoints initiated by support teams, delivering significant savings in time and effort, while boosting the overall experience of users, devices, and clients.

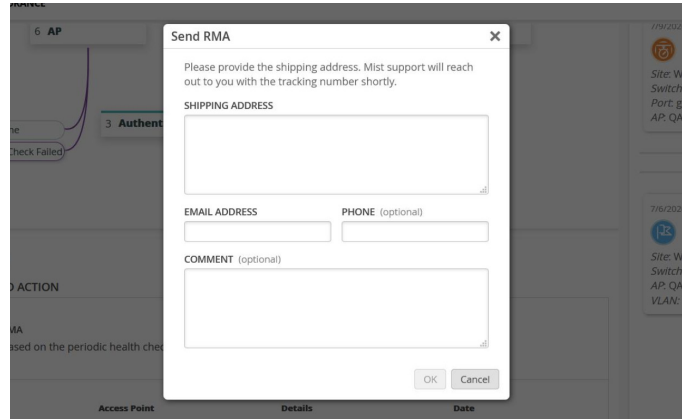


Fig 3: Marvis Actions

And with an API-driven interface, Marvis can trigger events, such as the automatic creation of a ticket on external support systems with email alerts and webhooks.

## Marvis Client Application Performance Kit (APK)

The Marvis Android client is a software agent that sits on the end-user device, collecting and displaying detailed client-device properties, including insight into client roaming behaviors. Additionally, the Marvis Client recognizes device connection types—cellular or Wi-Fi—along with the corresponding signal strength. This additional level of granularity lets admins better understand the Wi-Fi experience directly from the client's perspective.

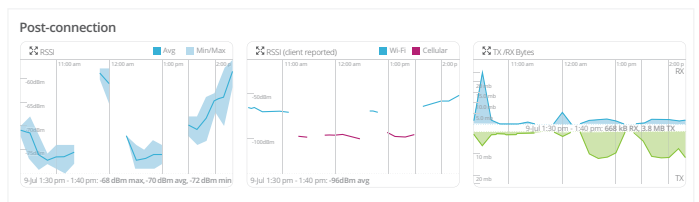


Fig 4: Post-connection details from Marvis client

The Marvis client further enriches the client device data. It goes beyond basic fingerprinting to provide an additional layer of detail, such as device type, manufacturer, and different versions of operating systems. The more details the client APK can draw out, the better the Mist AI engine gets at advanced device classification. Marvis continually learns and becomes more accurate in its ability to distinguish between device-specific issues or broad device issues, such as specifically identifying that OS version 8.1.0 is affecting certain clients.

## Anomaly Detection

Marvis incorporates anomaly detection within SLEs so administrators are notified of service-impacting events and can quickly identify and resolve the root cause of issues. Anomaly detection automatically applies machine learning to establish service baselines and triggers notifications when there is a deviation from known standards. The feature uses our third generation of algorithms in long-short-term memory (LSTM) and recurrent neural networks (RNN) to boost efficacy over 95%, minimizing false positives.

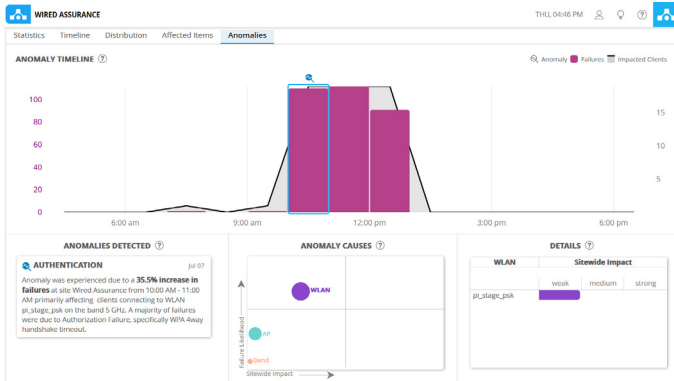


Fig 5: Wired Assurance anomaly detection

## Client Service Level Expectations (SLEs)

Marvis complements the client SLE framework. It applies machine learning to track and monitor client and device experiences with continuous behavioral analytics and network traffic analysis. The ability to understand these trends gives IT deeper insights for troubleshooting and planning.

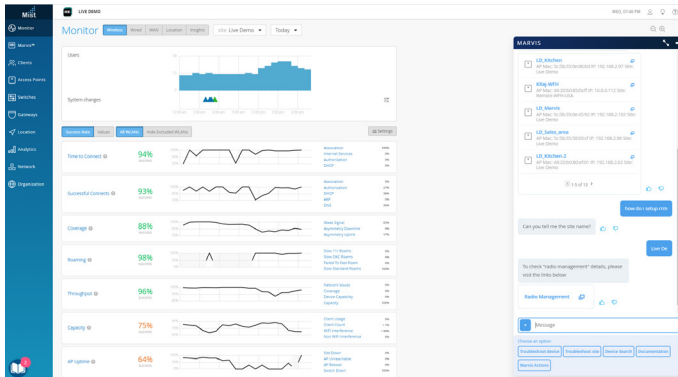


Fig 6: Wi-Fi Assurance client service-level expectations

## Multivendor Switch Insights

IT teams can use Marvis to gather health statistics of both Juniper and third-party switches connected to Juniper Access Points, including:

- How many access points are connected to a switch
- PoE compliance status, which helps manage and balance the power draw of connected devices
- Identification of VLANs that are misconfigured on switch ports where APs are connected but clients are getting blocked
- Version compliance for switches running dissimilar hardware
- Switch uptime

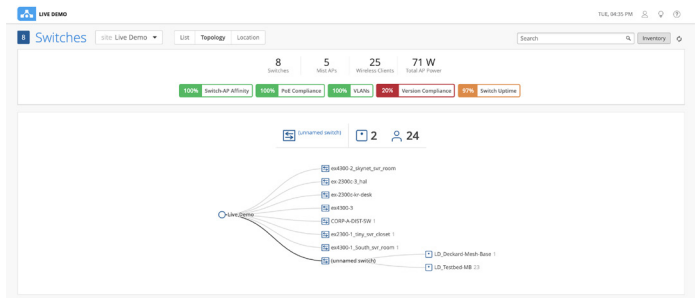


Fig 7: Wired Assurance switch-level insight

## 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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