Taiwan Innovation Day 2021

Bring AI to Life

AI-Driven Enterprise
新世代智慧網路

楊正言 Prado Yang
資深技術經理, Juniper Networks

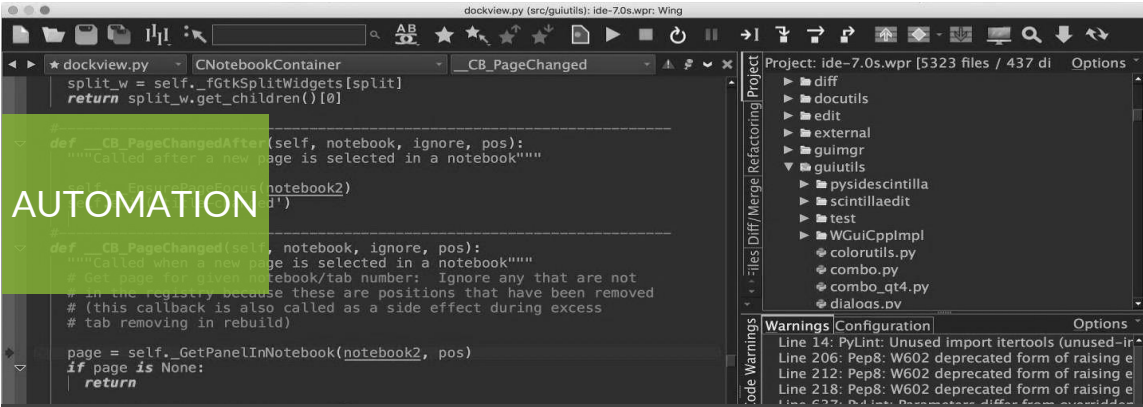# The Access Network must Adapt to Changing Times

ASSURANCE

Business critical services require more predictable, reliable, and measurable networks

INSIGHT

"Up" is not the same as "good"

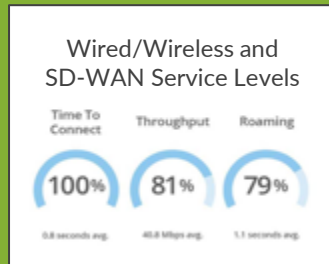AUTOMATION

Machines should configure machines

RELEVANCE

Deliver personalized experiences based on location, integrate with IoT

WIRED, WIRELESS DEVICES SOARING → AI IS CRITICAL FOR IT OPS

Juniper is Building the AI-Driven Enterprise

Unique Juniper Advantages

Client and application level visibility

Modern cloud with open APIs

AI-driven operations and support

Juniper Connected Security

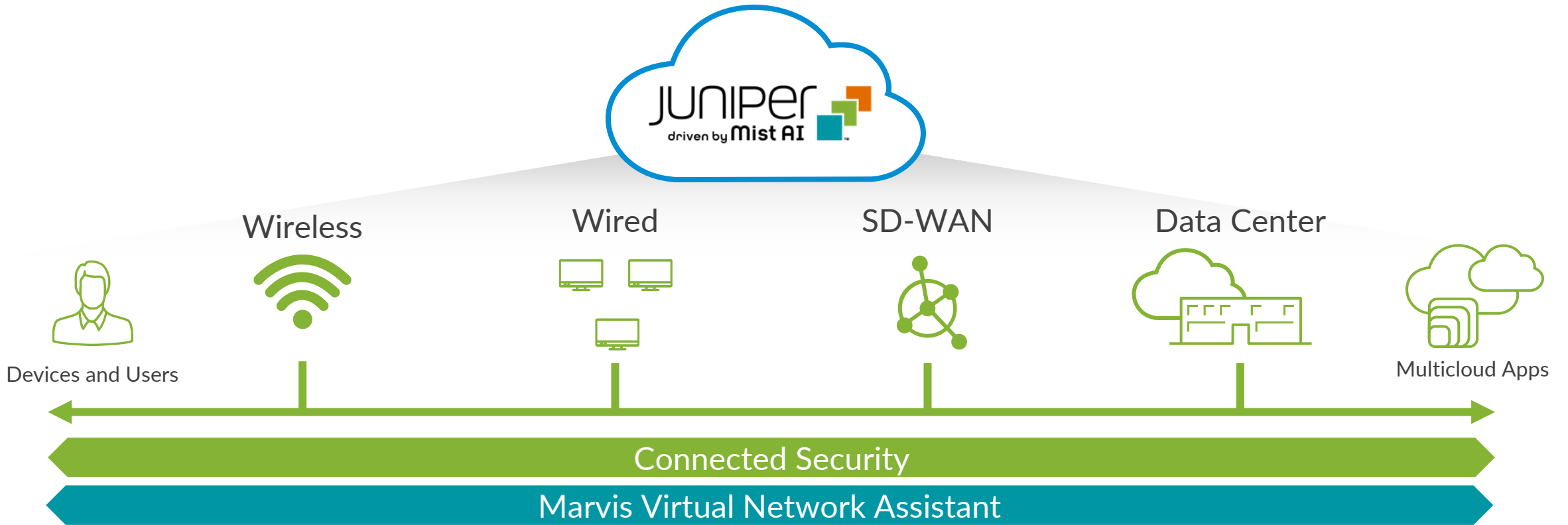|	
10	Of the Fortune 10 use Juniper
>40%	Of the Fortune 500 use Juniper
48	Of the Top 100 retailers use Juniper
5	Of the Top 10 Service Providers are running managed services with Juniper

Experience-First Networking from Client-to-Cloud

Wireless   **Wired**   **SD-WAN**   **Data Center**

Devices and Users   Multicloud Apps

Connected Security

Marvis Virtual Network Assistant

Juniper-Mist AI is leading a new era of IT with simplified operations, unprecedented scale, and the best user experiences from client-to-cloud.
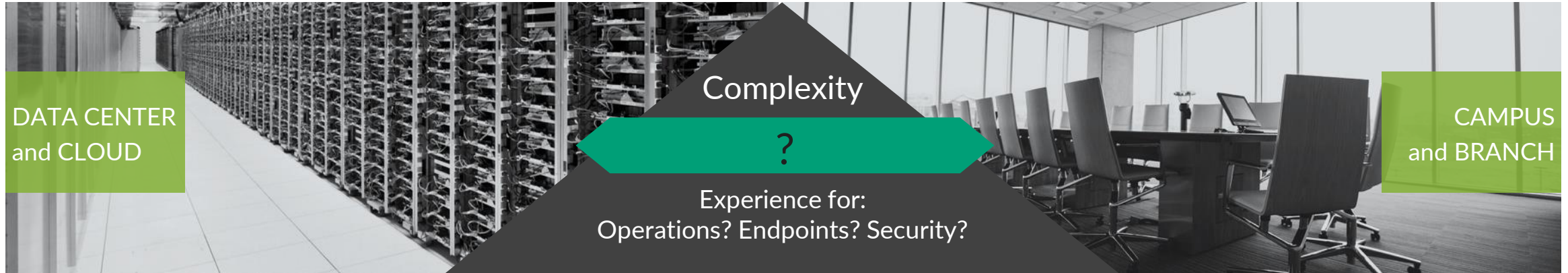
Taiwan Innovation Day 2021

Bring AI to Life

- **What is AI for?**
- **AI-Driven Campus**
- **Wired & Wireless Assurance**
- **WAN Assurance**
- **Marvis Virtual Network Assistant**
- **Summary**

What is AI for?

Where Does AI Make a Difference?

DATA CENTER and CLOUD

Complexity

?

Experience for:
Operations? Endpoints? Security?

CAMPUS and BRANCH

• Consistent workloads	• Diverse devices
• Controlled environment	• Bad actors and unknown people and devices
• Known connectivity	• Diverse and hybrid connectivity
• Experience defined at the level of aggregate service	• Experience defined at the level of every user | endpoint

Predictable & Uniform

Unpredictable & Variable

DIVERSE INFRASTRUCTURE leads to DIVERSE OPERATIONS

AI for IT

The AI-Driven Enterprise

ABSTRACTED CONTROL	AUTOMATED WORKFLOWS	AI-DRIVEN EXPERIENCE and INSIGHTS

- SDN management of a fleet, not each device
- Centralized telemetry and analytics
- Cloud is optimal for AI storage / compute

- Simplified and streamlined workflows
- API programmable to integrate systems
- AI virtual assistants facilitate workflows

- Elevate ops and user experience
- Automatic troubleshooting and regulation
- Correlate, predict and identify patterns

WHY A.I. ? *"experience is the new uptime"*

AI for IT: What Is It?

SEE	KNOW	DO
• Collect data • Structure, optimize and filter • Analyze and visualize data	• Processing and data science • Machine learning and deep learning • Identify and signal problems or patterns	• Automate response/decisions • Automatically regulate & remediate • Raise actionable insights and predictions

WHAT IS A.I. ?

" *If a typical person can do a mental task with less than one second of thought, we can probably automate it using AI.*
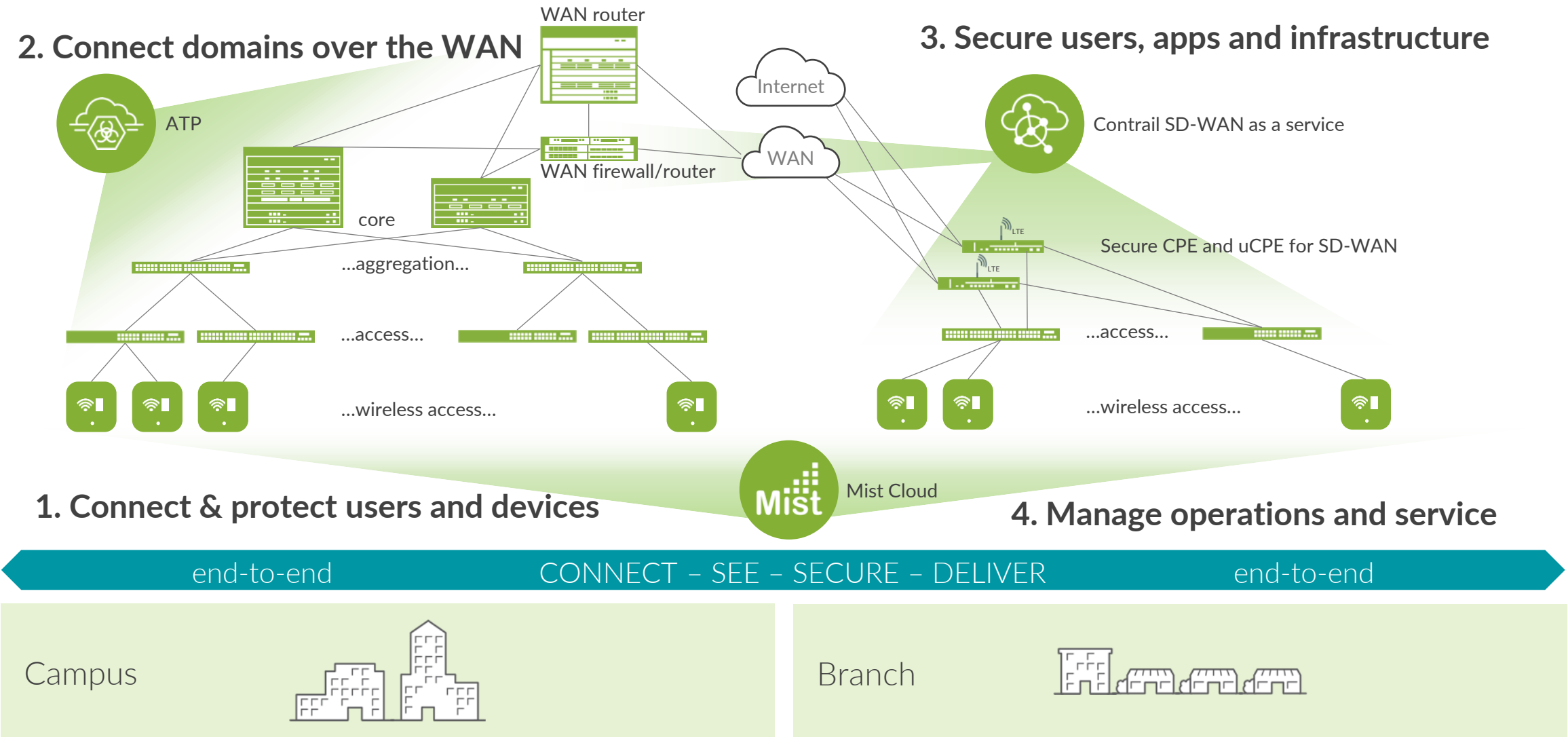
- Andrew Ng
Director of Stanford AI Lab

" *Artificial Intelligence is the science of making machines do things that would require intelligence if done by people.*

- Marvin Minsky
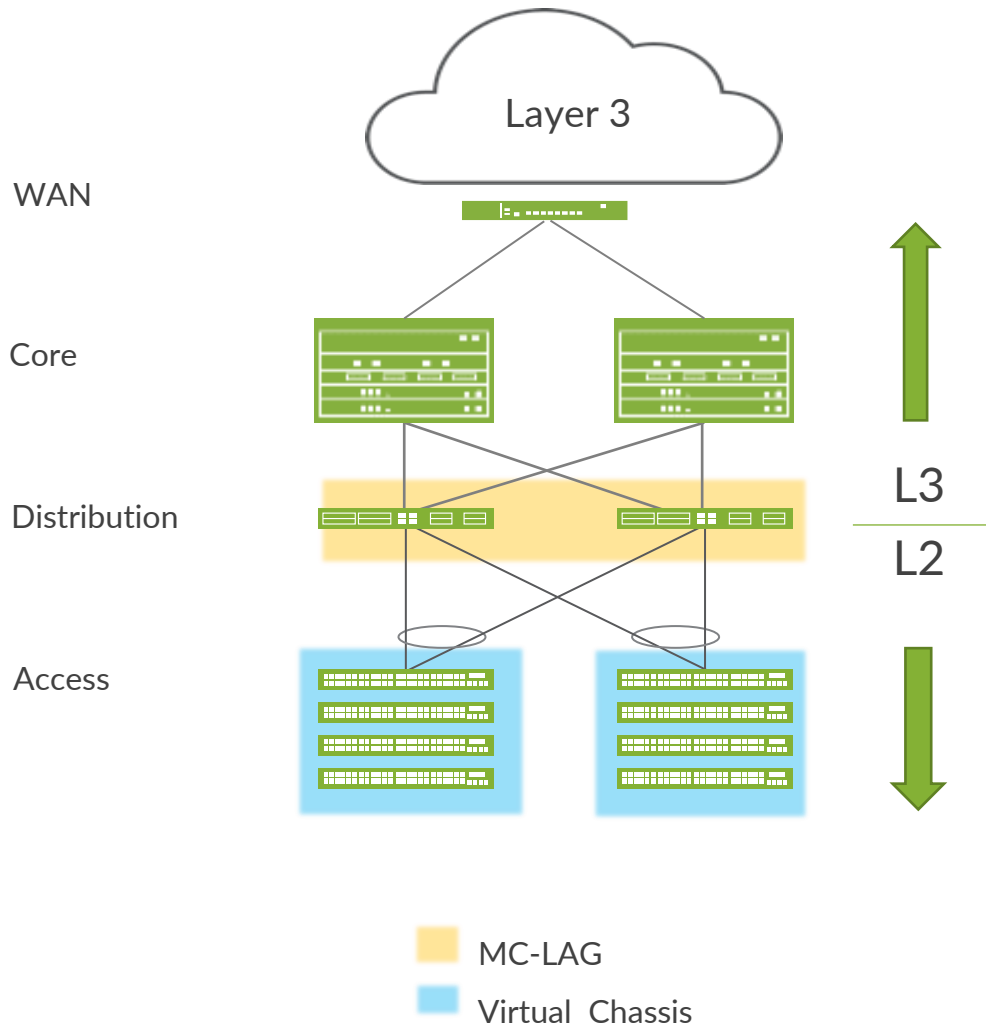*Founder of the MIT AI Lab*

AI-Driven Enterprise – It's End to End

**2. Connect domains over the WAN**

WAN router

ATP

3. Secure users, apps and infrastructure

Internet

WAN

WAN firewall/router

Contrail SD-WAN as a service

core

LTE

LTE

Secure CPE and uCPE for SD-WAN

...aggregation...

...access...

...access...

...wireless access...

...wireless access...

Mist Cloud

1. Connect & protect users and devices

4. Manage operations and service

| end-to-end | CONNECT – SEE – SECURE – DELIVER | end-to-end |

Campus

Branch

JUNIPER driven by Mist AI

AI-Driven Campus

Problems with Campus Networks Today

Layer 3

WAN

Core

Distribution

Access

L3
—
L2

MC-LAG

Virtual Chassis

1) Layer 2 user devices connecting to layer 3 Network

2) Proprietary technologies to eliminate STP loops

3) Non-flexible and non-scalable networks

4) Not designed for Mobility and IOT

5) Increasing number of ACLs on every device

EVPN–VXLAN Solves Many Campus Problems

Layer 3

WAN

Core

Distribution

L3

Access

L2

EVPN-VXLAN

Virtual Chassis
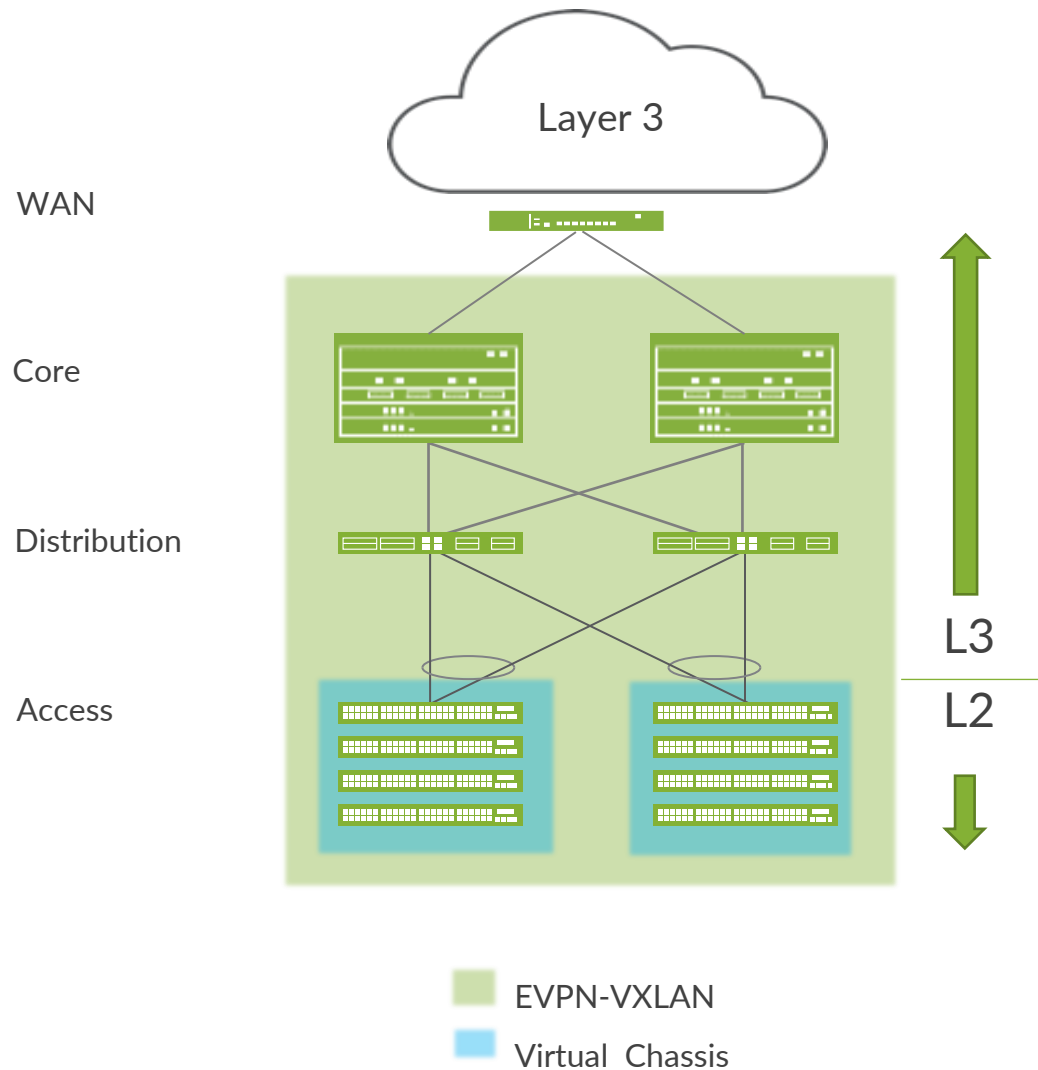
~~1) Layer 2 user network connecting to layer 3 internet~~

1) Layer 2 overlay network over layer 3

~~2) Proprietary technologies to eliminate STP~~

2) Standards based technology

~~3) Non-Flexible and non-scalable networks~~

3) Flexible and scalable

~~4) Not designed for Mobility and IOT~~

4) Fast convergence and microsegmentation

~~5) Increasing number of ACLs on every device~~

5) Network wide Group based Policies (GBP)

Campus Fabrics

Flexibility

Choice

High Availability

Always Up

Performance

Scalable

| Elastic network design | Build fail-safe network | Designed for future needs |

Automating Every Step of the Way

The best access layer experience

Day 0: Provision	Day 1: Deploy	Day 2+: Operate

- Single click activation via ZTP for greenfield
- Adopt switches for brownfield
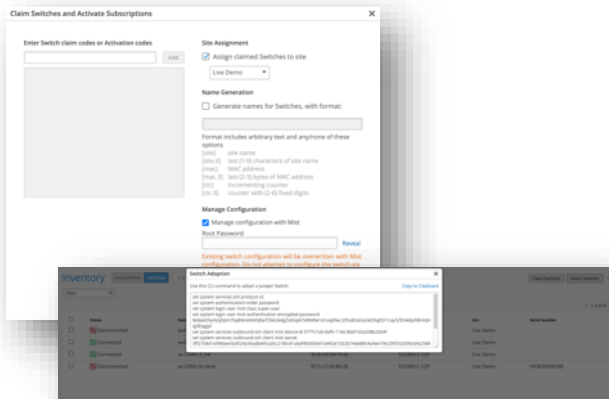
- Template based configuration
- Port/interface profiles
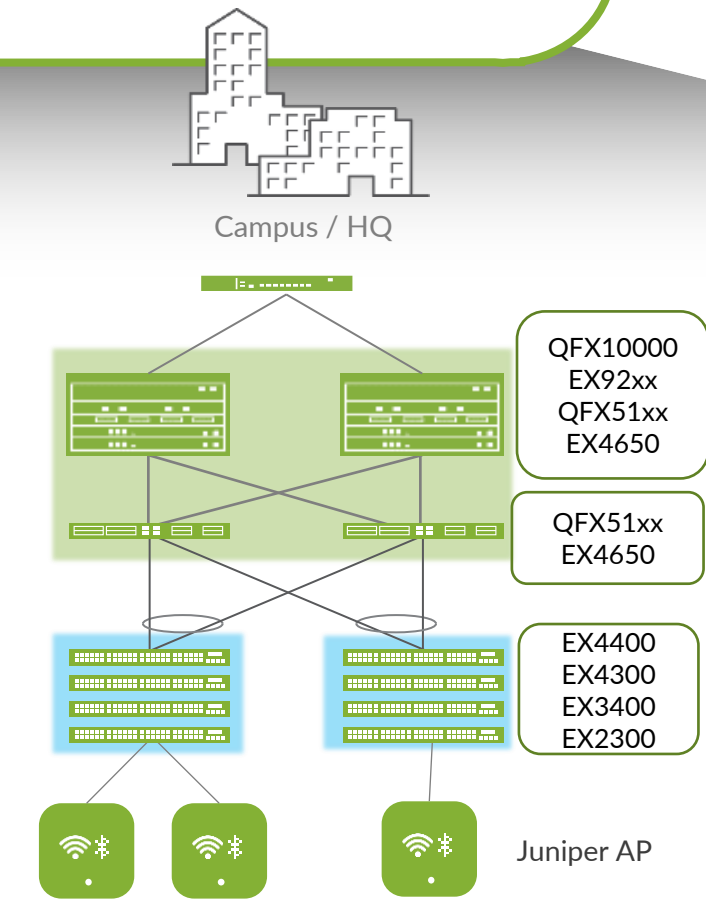- Color/colorless ports
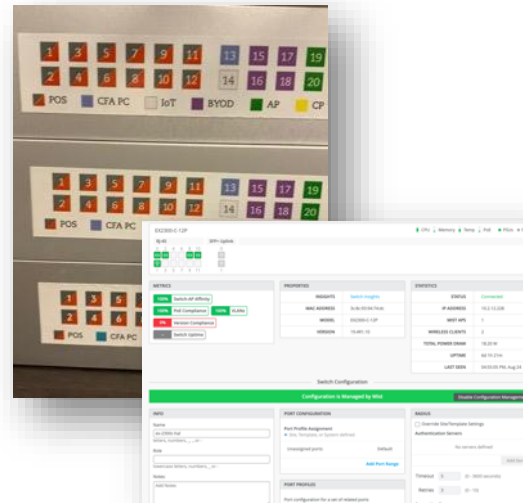
- Alert
- Monitor
- Troubleshoot
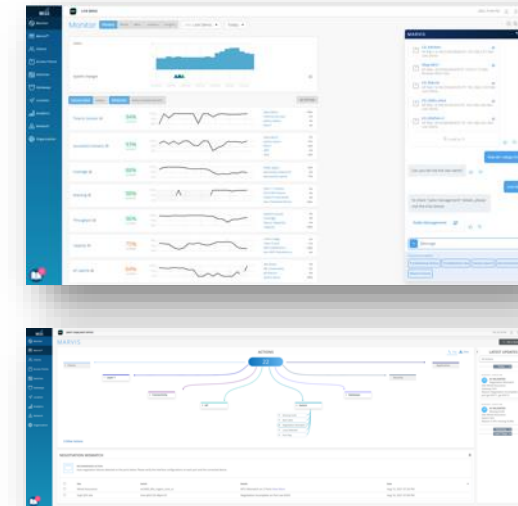
Campus Architectures
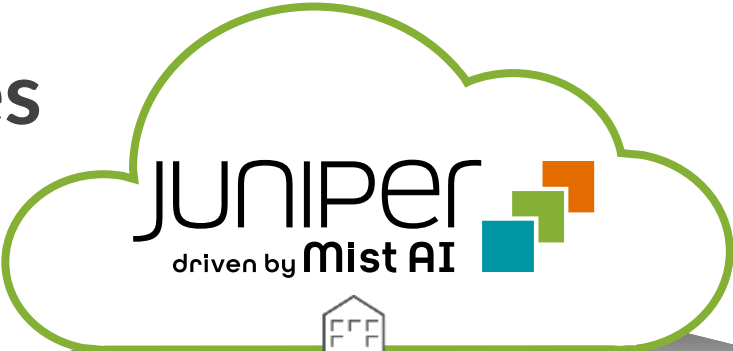
EVPN-VXLAN
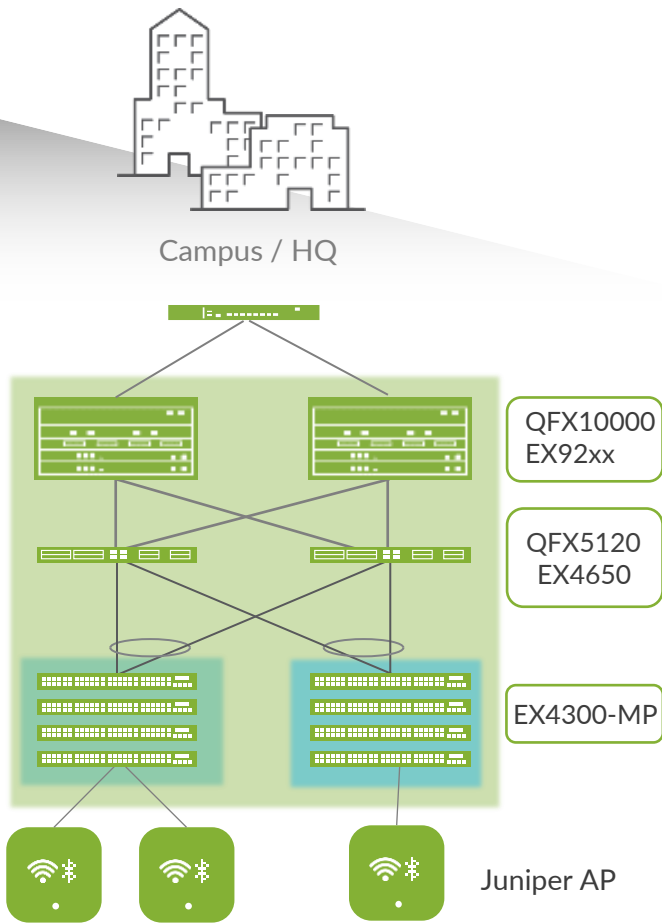
Virtual Chassis

EVPN Multihoming

Small/Medium Campus

WAN	
Core	QFX51xx EX4650 EX92xx QFX10000
Distribution	Collapsed core
Access	EX4400 EX4300 EX3400 EX2300

Juniper AP
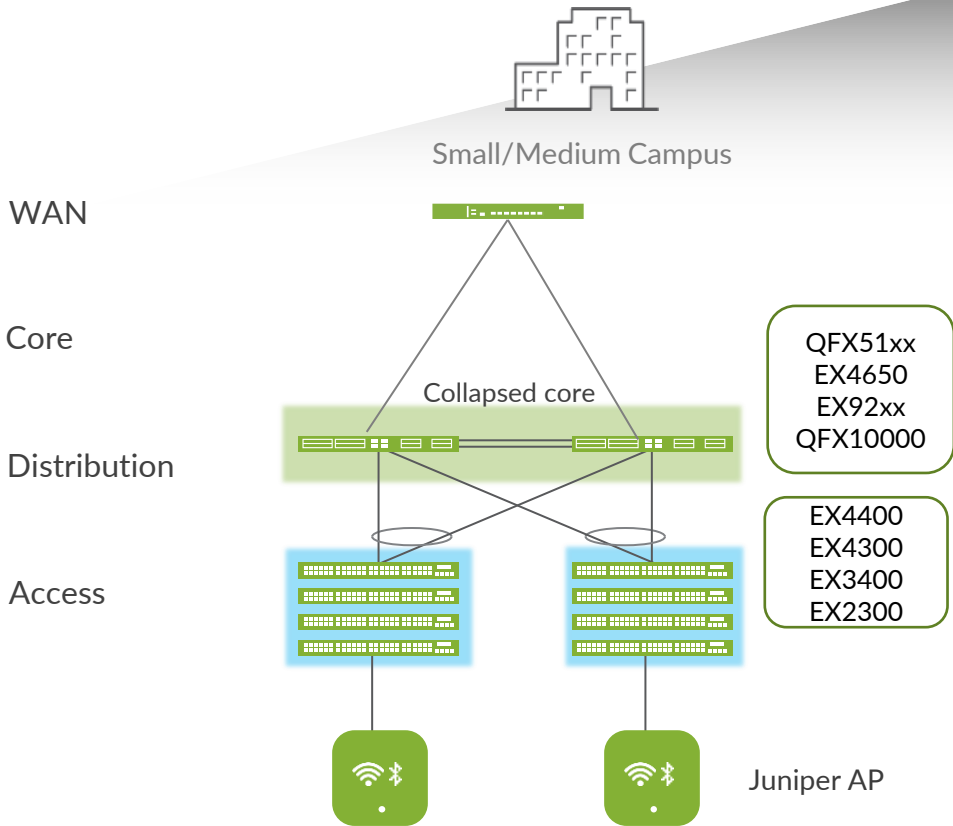
Campus Fabric Core-Distribution

Campus / HQ

QFX10000
EX92xx
QFX51xx
EX4650

QFX51xx
EX4650

EX4400
EX4300
EX3400
EX2300

Juniper AP

Campus Fabric IP Clos

Campus / HQ

QFX10000
EX92xx

QFX5120
EX4650

EX4300-MP

Juniper AP

Building an AI-Driven Campus Fabric

| Describe the **WHAT** | Software delivers the **HOW** | Know **WHEN and WHY** |

Architect

EX 2300

EX 3400   EX 4600/4650

EX 4400   EX 4300

QFX 5110   QFX 5120

Operator

>> **Intent** >>

Closed-loop Automation and Assurance

<< **Analytics** <<

| **Design** | Deploy | Operate |

Unbox the EX

Cloud ZTP Enabled

1 Scan QR Code

2 Login to claim the EX
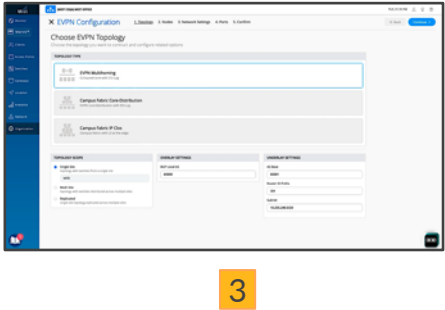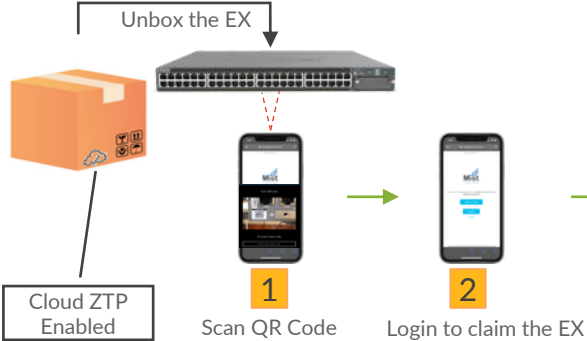
3 Design and deploy an AI-driven Campus Fabric

4 Troubleshoot and Manage with Marvis and Mist AI
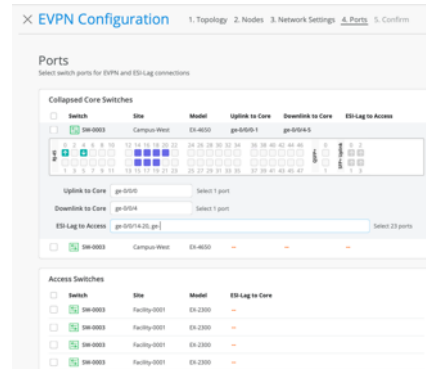
Campus Fabric Deployment

1
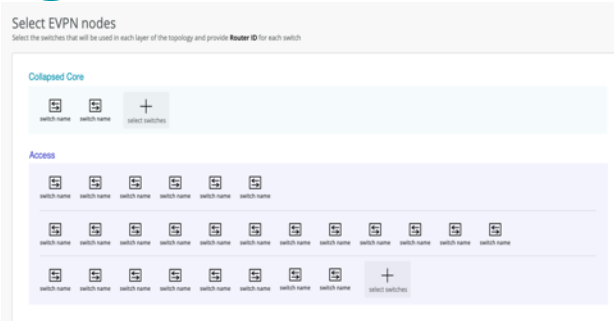
Choose the topology and allocate device roles

- Define the intent for the topology definition (IP-Clos, Multi-homing etc)
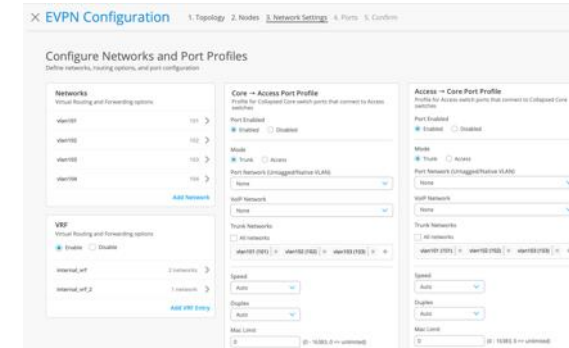- Choose device roles – access, distribution, core

2

Define Physical Connections

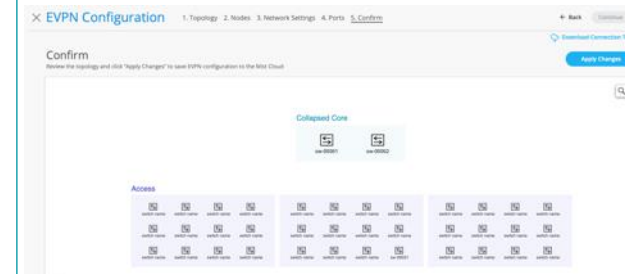- Provide the physical connectivity between – core/distribution and access devices

3

Define Networks of Interest
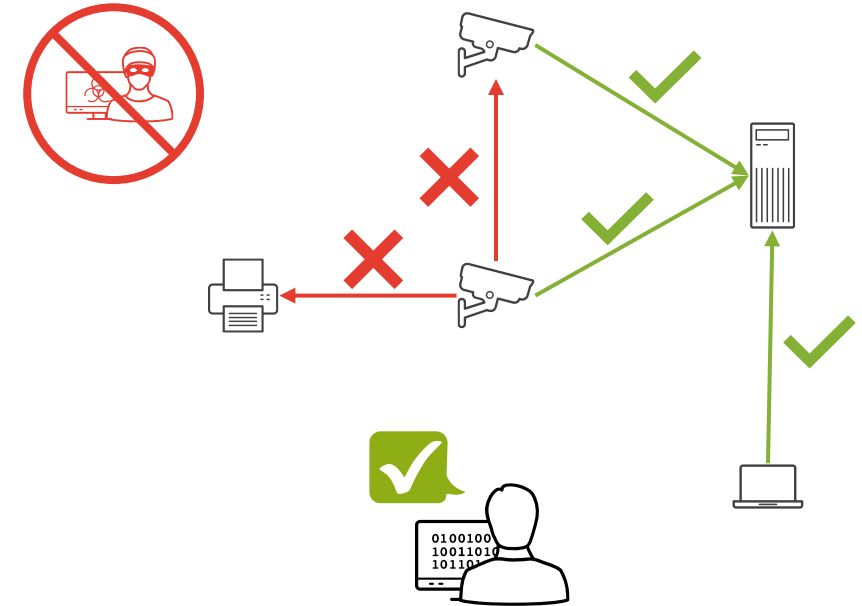
- Configure the user networks

4

Apply the intent

- Verify, apply and confirm the intent of provisioning the fabric

Standards-based Microsegmentation
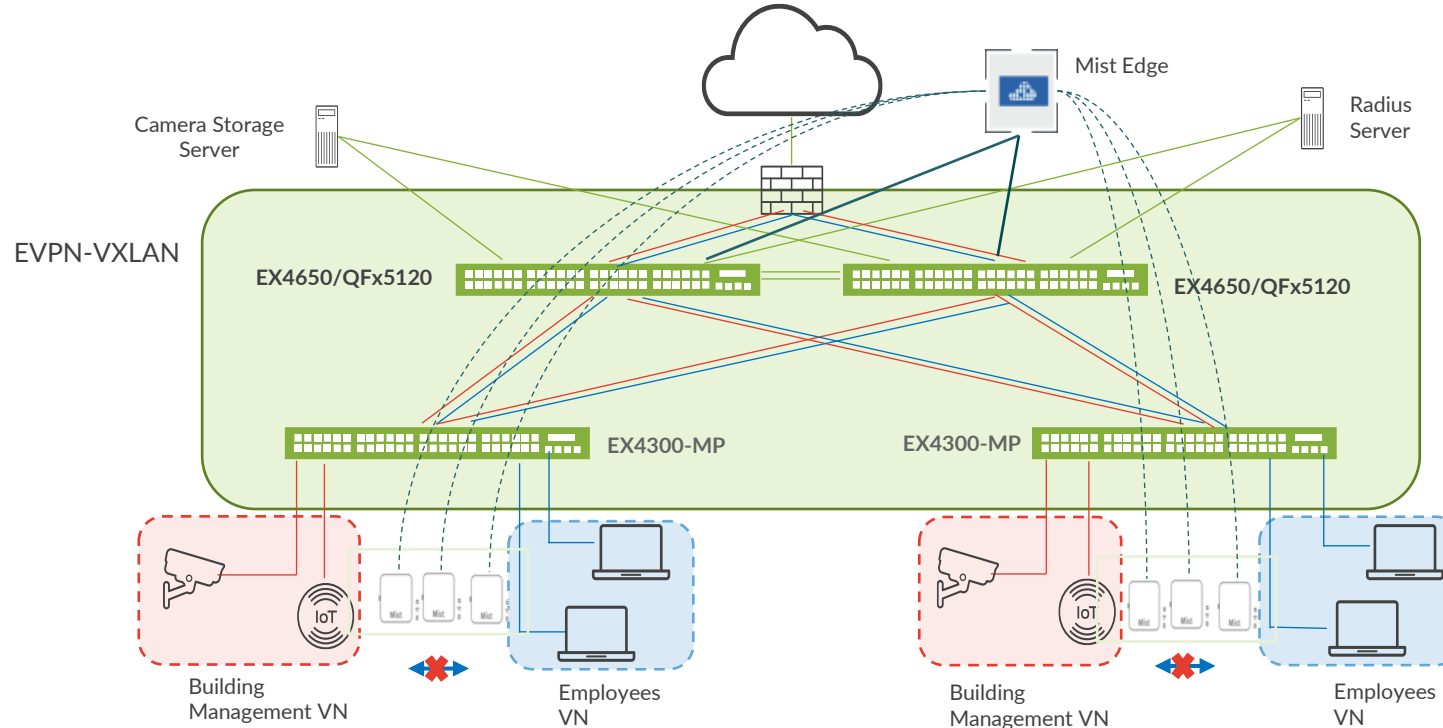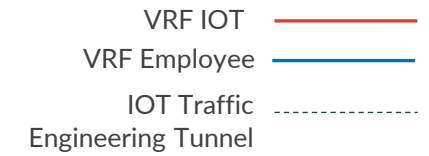

Group Based Policies (GBP)

- Leverage underlying VXLAN infrastructure
- Granular access policy & controls
- Location agnostic end to end security

Outcomes

- Consistent security policies across the network
- Ability to block lateral threats
- Reduce ACLs

ACLs

Identity-Based Segmentation

VRF IOT
VRF Employee
IOT Traffic Engineering Tunnel

Mist Edge

Camera Storage Server

Radius Server

EVPN-VXLAN

EX4650/QFx5120

EX4650/QFx5120

EX4300-MP

EX4300-MP

Segmentation

Logical segmentation across business function

Layer 2 or Layer 3

Access Control

Consistent Policy

User group-based access

PacketFence

A³

Microsoft Active Directory

CLEARPASS

freeRADIUS

ForeScout CounterACT

Building Management VN

Employees VN

Building Management VN

Employees VN

Device Profiling

SD operations

Device fingerprinting

Dynamic VLANs

VN (Virtual network) First level Segmentation ensures zero communication between forwarding domains. Static or dynamic VLAN and Filter assignment prevents lateral communication within the VN

JUNIPER driven by Mist AI

Wired & Wireless Assurance

Challenges Faced in Unifying the Wired & Wireless

Challenges with traditional networks:

⚠ Complexity, devices and data soaring

⚠ Existing solutions are for management, not operational efficiency

⚠ Wired and wireless networks lack AI assist

⚠ Monolithic systems lack cloud agility, elasticity

⚠ Incomplete API's limit ability to automate

⚠ Reduce risk as employees return to work
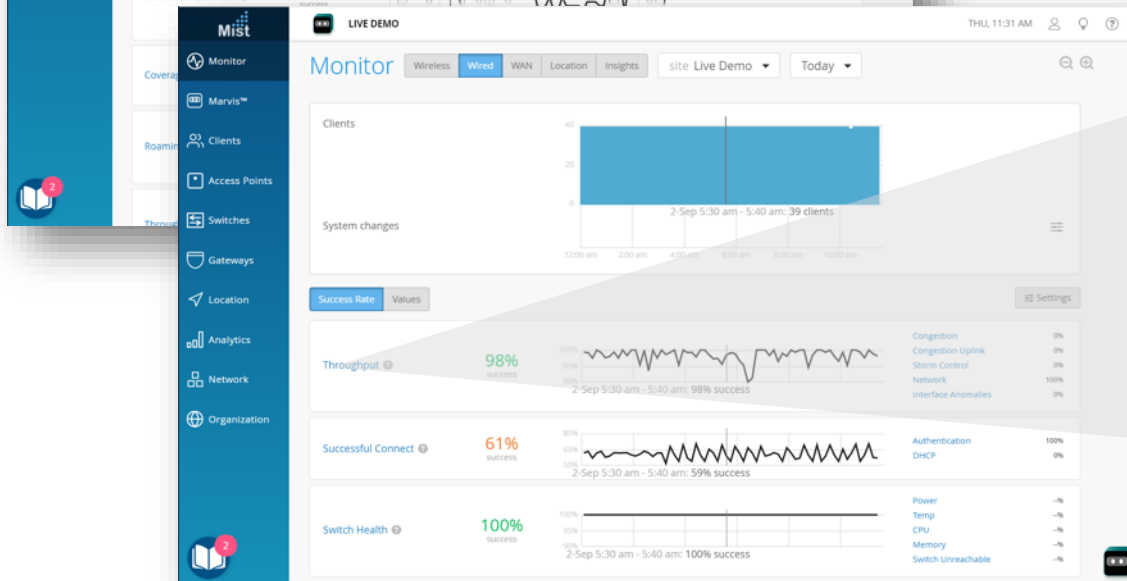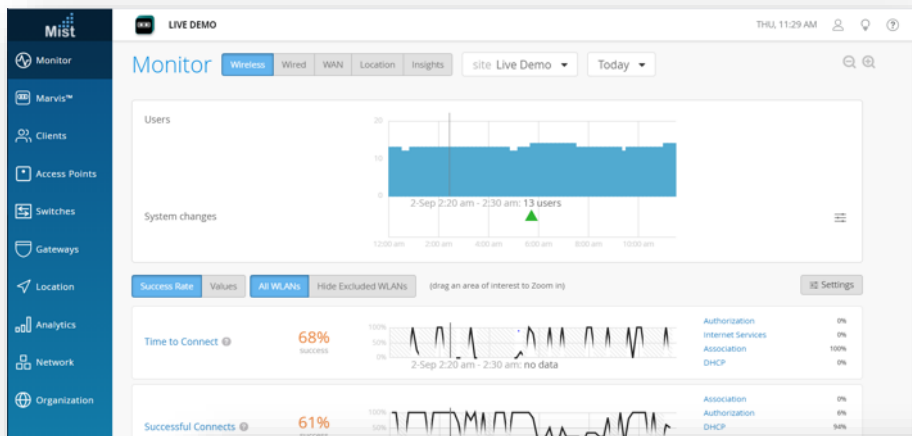
Unify the Wired and Wireless

Juniper Mist Solution Benefits

- Deliver great user, device and client experiences through Service Level Expectations (SLEs)
- Build scalable, agile and reliable services with a microservices cloud architecture
- Transform IT with AIOps and support to lower costs
- Deliver a differentiated service through complete 100% programmable APIs
- Mitigate risks with SecIntel to Mist to deliver threat visibility and enforcement

Wireless   **Wired**   **Security**   **WAN**   **Data center**

API   **API**

Visibility and Policy Control

Service Level Expectations (SLEs)

Wi-Fi Assurance & Wired Assurance

- Manage user and device experience; up ≠ good

- Measure pre-/post- connection metrics for key wired and wireless criteria

- Deliver proactive anomaly detection to identify and determine root cause
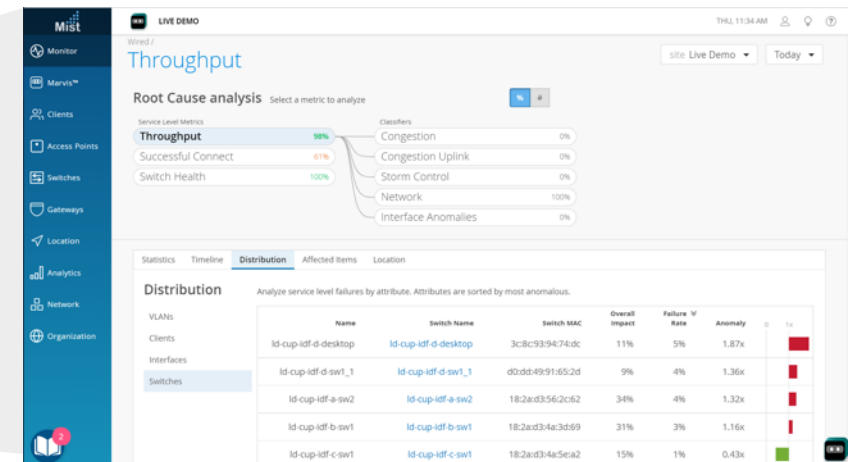
Wired Assurance with Juniper EX Switches

Seamless, Simplified Onboarding with ZTP

– Single click activation for greenfield, adopt switches for brownfield

Template-based Configuration with Device & Port Profiles

– Scale with consistency using static or auto-provisioning for color and colorless ports
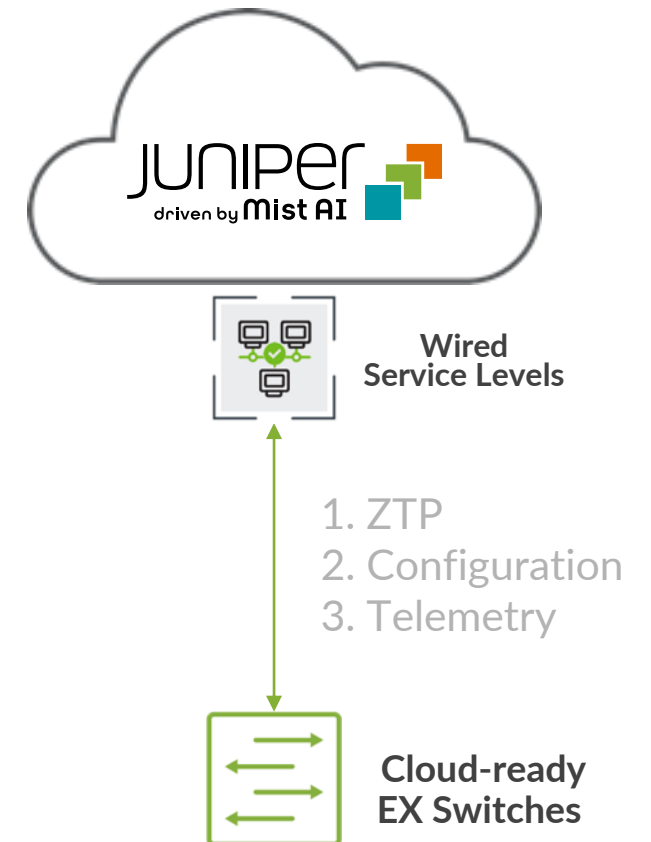
Wired User Service Level Expectations (SLEs)

– Throughput, Successful Connects, Switch Health

– AI-Driven Switch Insights (CPU, temp, mem, PoE, interface, fan, power supply, VC port status, etc.)

Switch Events - Correlation

– Configuration changes, system alerts

Marvis Virtual Network Assistant

– Switch intelligence when debugging a user/AP

– Marvis Actions (Adds missing VLANs, fixes misconfigured ports, identifies bad network cables, STP loops)

Wired Service Levels

1. ZTP
2. Configuration
3. Telemetry

Cloud-ready EX Switches

Wired Assurance Unique Advantages

Amazing User Experiences

- Client Service Level Expectations (SLEs)
- Self-driving Network™
- Add Marvis Virtual Network Assistant

AI-Driven Operations

- Switch insights
- Event correlation
- Add Marvis Actions for self-driving remediation

Automation

- Programmable workflows
- 100% open APIs
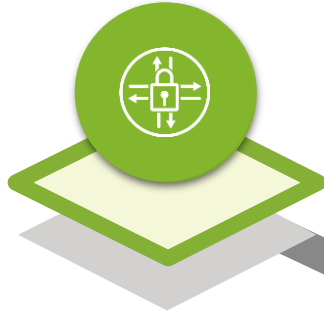- Microservices cloud platform

Full Stack Portfolio

- Driven by Mist AI
- LAN, WLAN, WAN, Security
- Unified experiences and troubleshooting

WAN Assurance

Juniper Brings AI to WAN Transformation

Juniper has been a leader in routing and security since 2004

Feature-rich SSR provides software and policy orchestration with security

TODAY

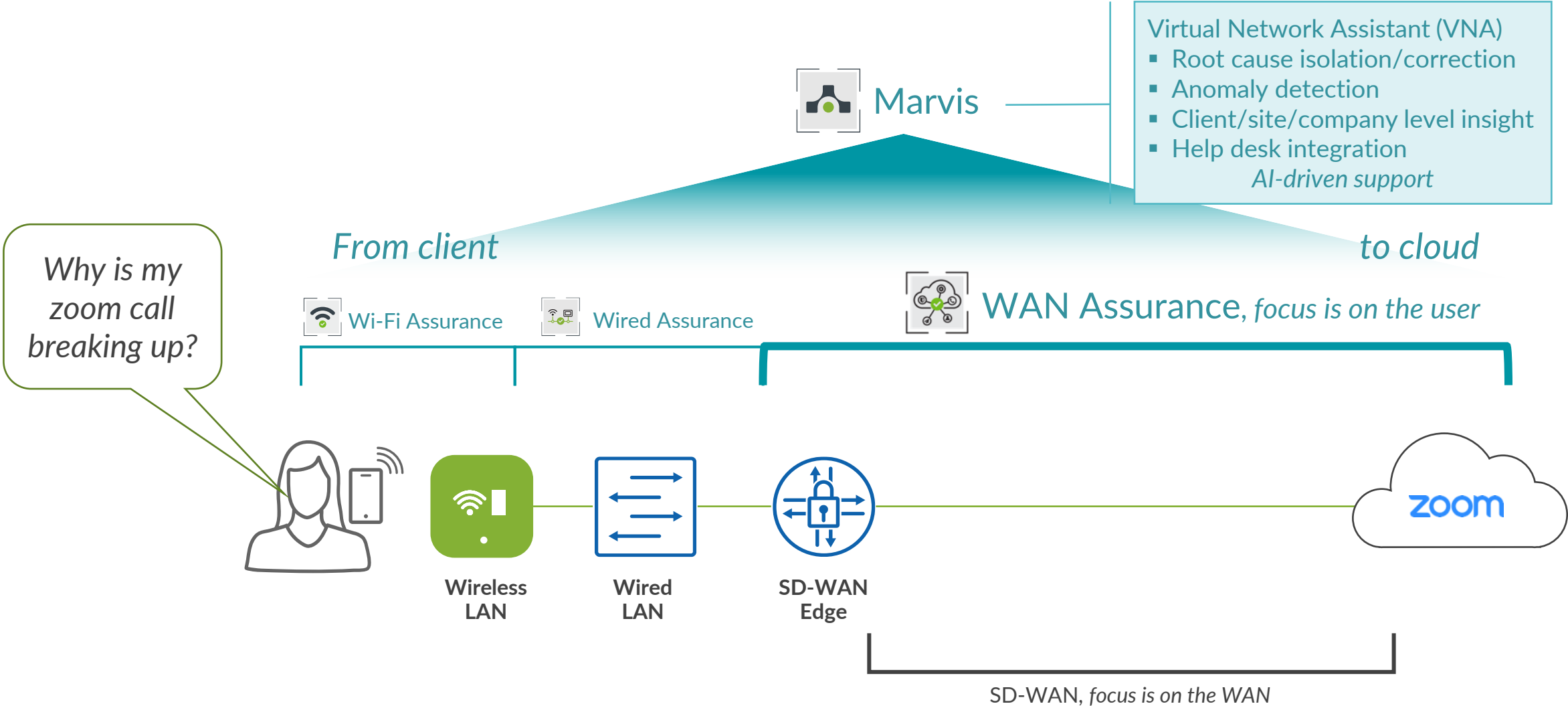User & app experience centric - AI assisted operations for WAN

Secure Routers
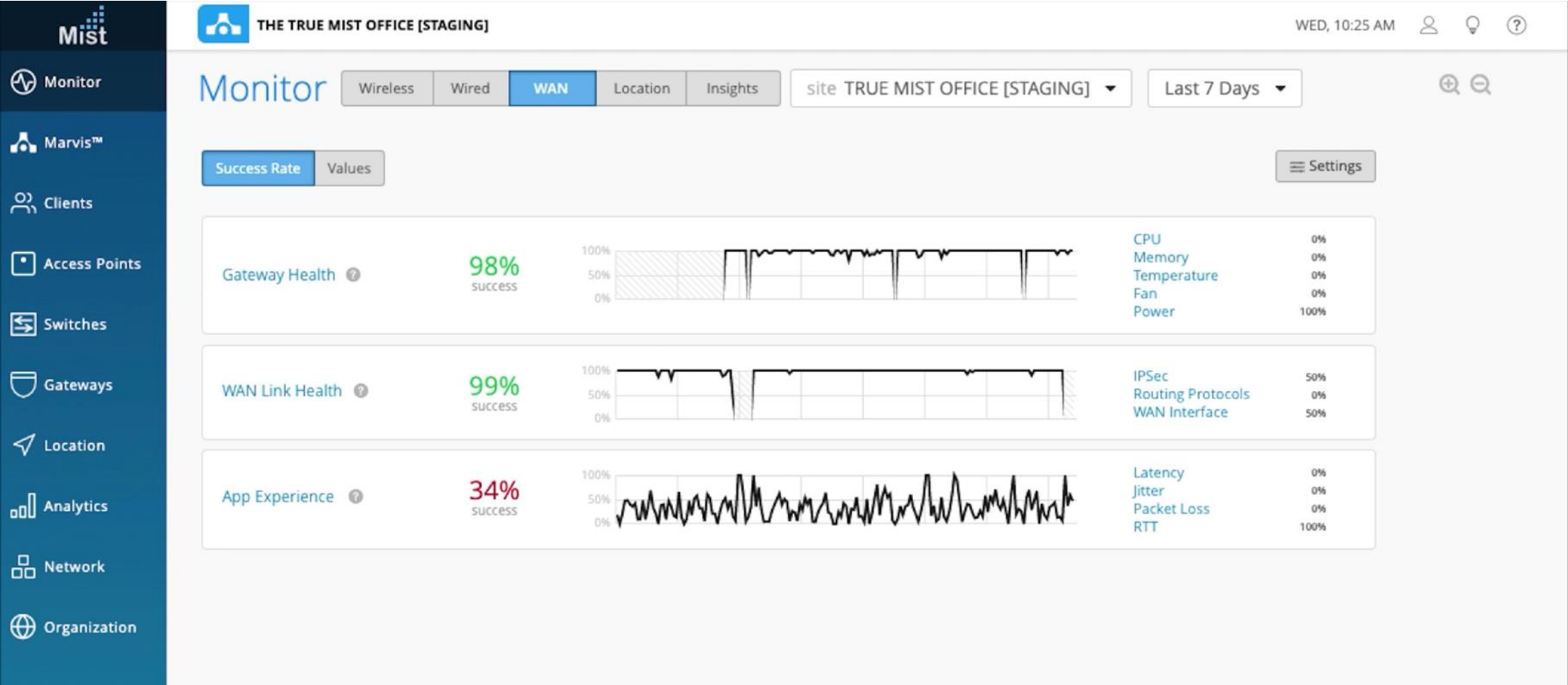
Secure SD-WAN

AI-Driven WAN

WAN Assurance – Bringing Insight Into User Experience

Marvis

Virtual Network Assistant (VNA)
- Root cause isolation/correction
- Anomaly detection
- Client/site/company level insight
- Help desk integration
    AI-driven support

From client   *to cloud*

Why is my zoom call breaking up?

Wi-Fi Assurance   Wired Assurance   WAN Assurance, *focus is on the user*

Wireless LAN   **Wired LAN**   **SD-WAN Edge**   zoom

SD-WAN, *focus is on the WAN*

WAN Assurance – SLE Insights

Juniper Business Use Only

Juniper Mist WAN Assurance, Driven by Mist AI

Marvis Virtual Network Assistant

Marvis WAN Assistant
- Why is application experience suffering – WAN impact
- WAN intelligence when debugging a wired/wireless user performance
- What is wrong with WAN routers / circuits

Marvis Actions for WAN
- Recommend policy changes based on user & app experiences

AI-Driven Customer Support
- Determine device failures and automate support escalation and RMA

WAN Assurance

User Service Levels across WAN with Proactive Anomaly Detection
- Throughput
- Application
- Device Health

WAN Edge Events
- Configuration Changes, System Alerts, Interface State, Tunnel State, QoS/Failover Triggers

WAN Insights
- Bandwidth
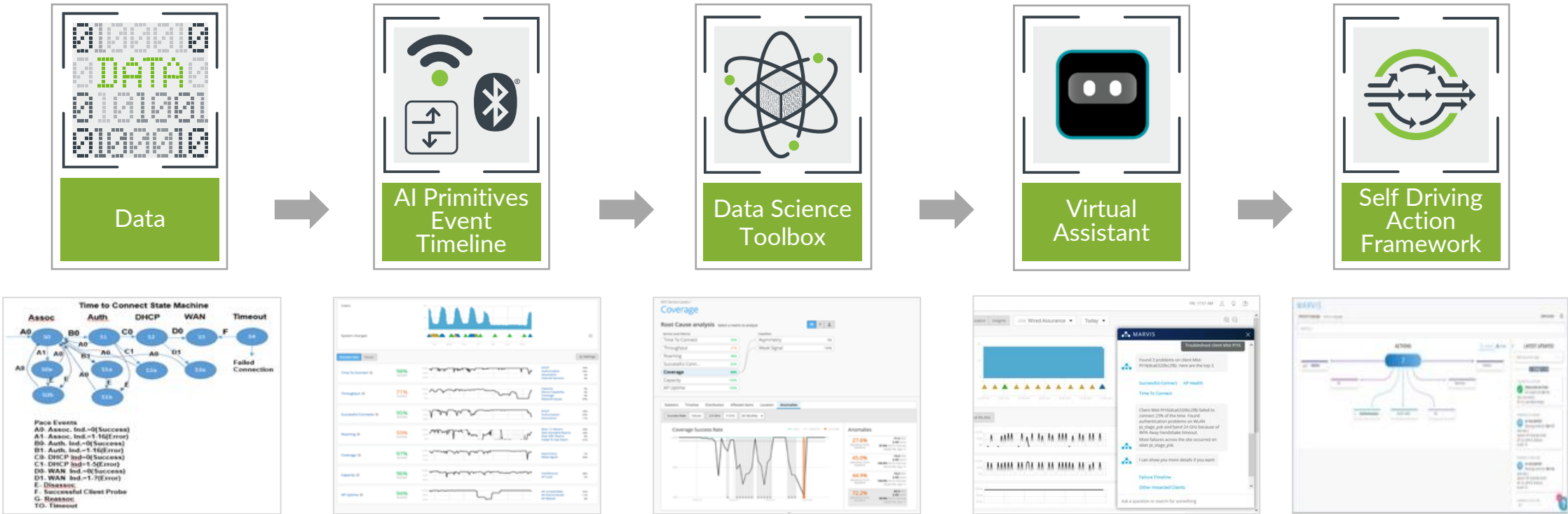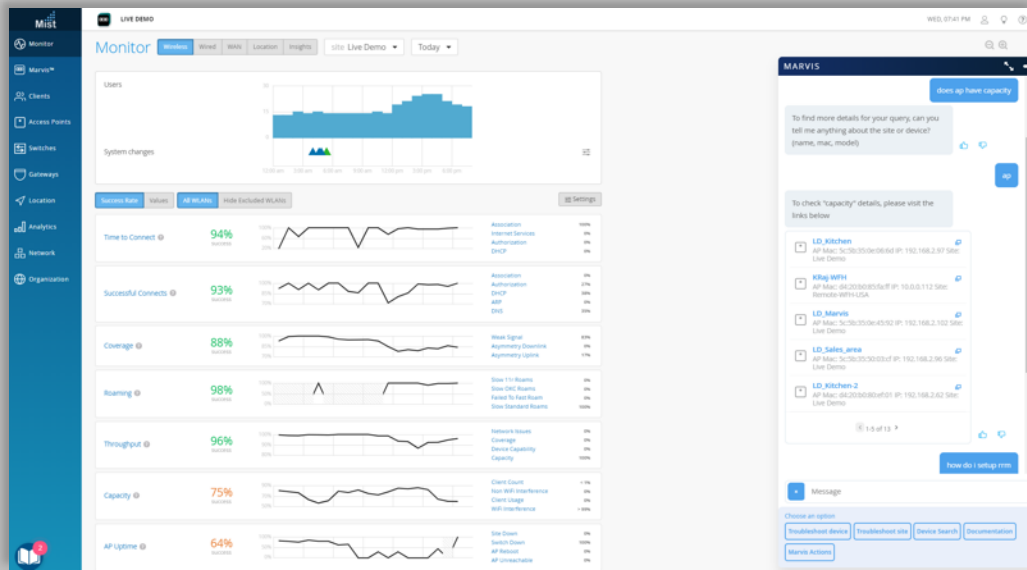- Application performance and trends

Actions

Telemetry data

SRX
vSRX
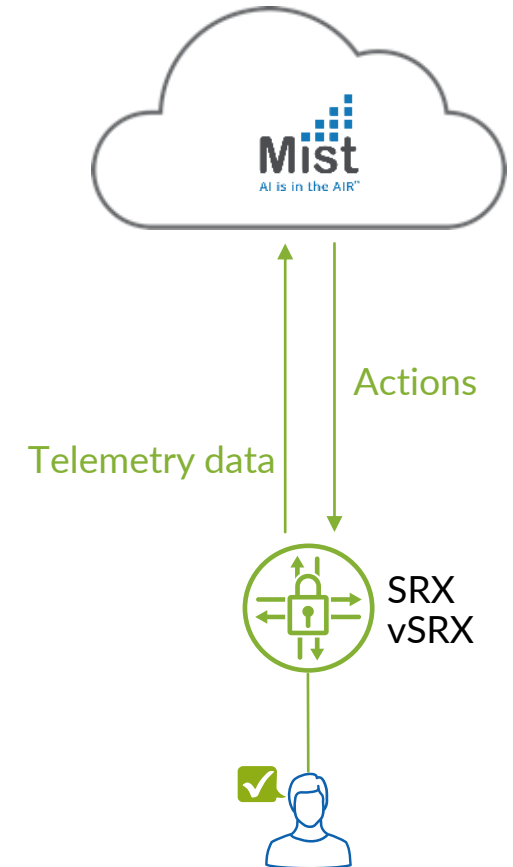
Marvis Virtual Network Assistant

Marvis: The Journey to an AI-Driven Enterprise

Modern Cloud Stack and Security

| Data | → | AI Primitives Event Timeline | → | Data Science Toolbox | → | Virtual Assistant | → | Self Driving Action Framework |

Client\3rd party\WAN\Wired\Wireless

Marvis Virtual Network Assistant (VNA)

Marvis conversational interface applies NLP to transform how IT teams interact with the network, while streamlining operations and boosting user experiences

Marvis Actions delivers a self-driving network with automatic actions or a "driver-assist" mode to identify recommended actions with high efficacy

Marvis Conversational Interface
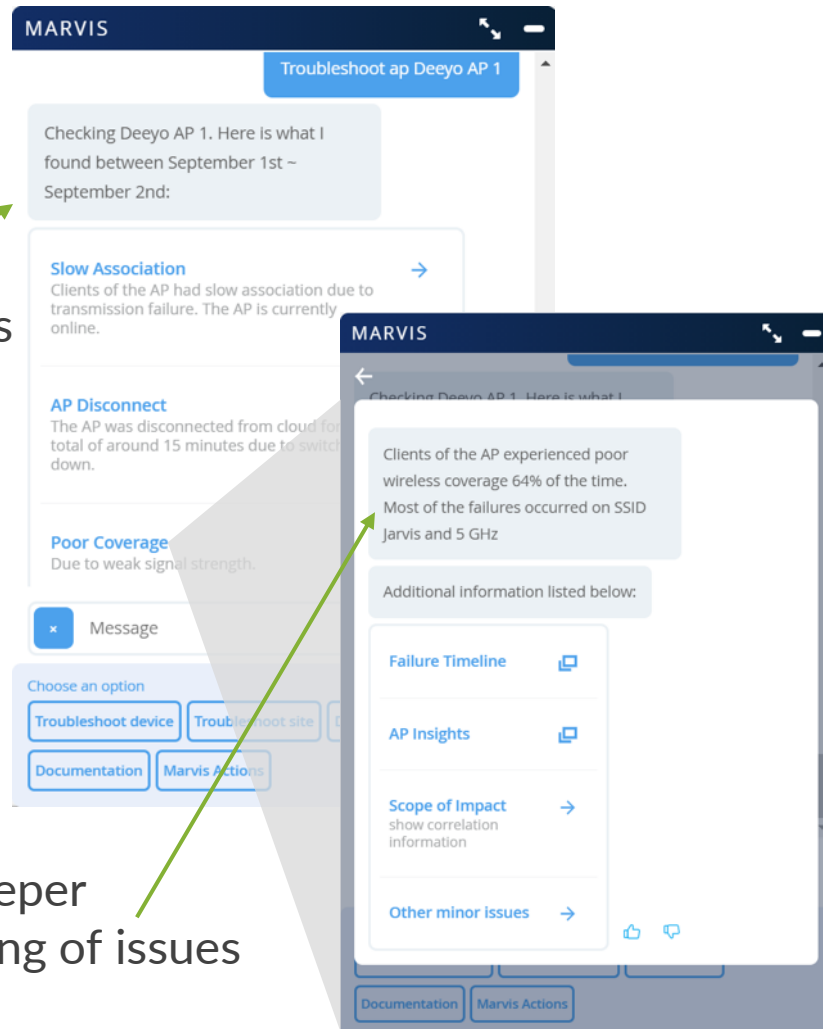
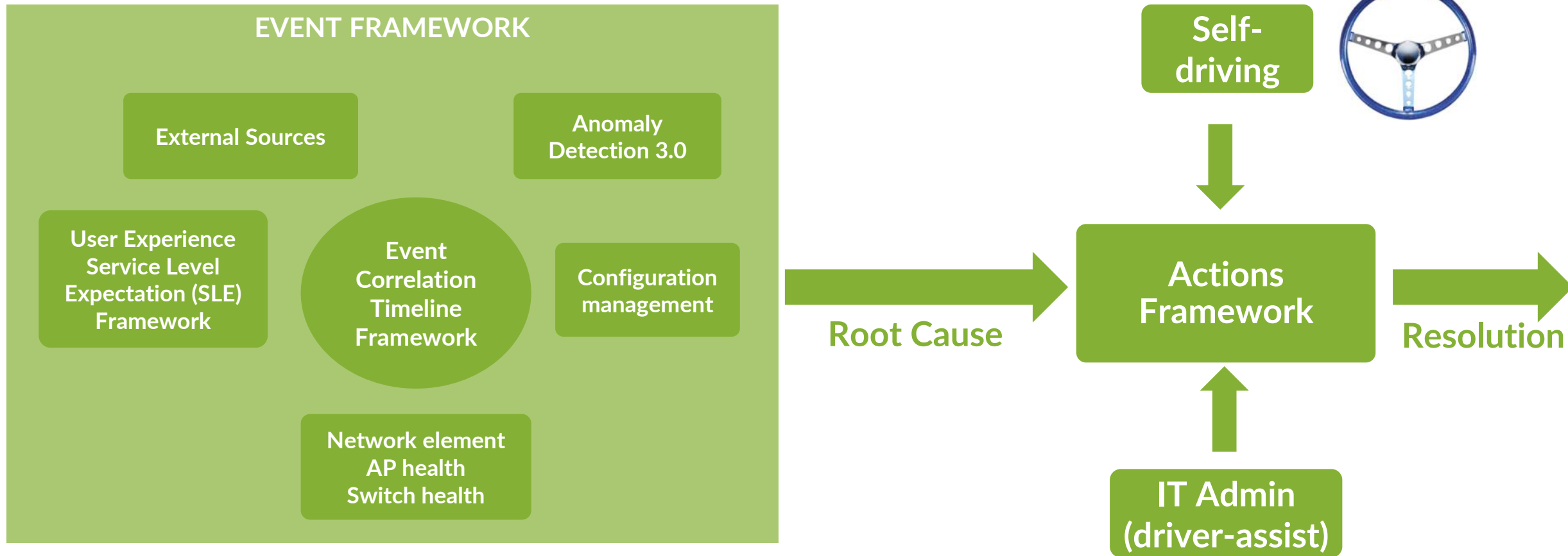Understands user intent with NLP

Provides deeper understanding of issues

One stop shop for IT teams to...

- Get faster answers with chat vs. search
- Take actions as part of a conversation

Marvis offers...

- Improved language understanding (NLP)
- Suggested next steps when isolating issues
- The ability to learn and adapt based on user feedback

Entity Event and Actions Framework

EVENT FRAMEWORK

External Sources

Anomaly Detection 3.0

User Experience Service Level Expectation (SLE) Framework

Event Correlation Timeline Framework

Configuration management

Network element AP health Switch health

Root Cause

Self-driving

Actions Framework

Resolution

IT Admin (driver-assist)

Marvis Actions for a Self-Driving Network

Root cause analysis across WLAN, LAN, WAN and Security

A few things Marvis can do:

- Track/manage firmware upgrades
- Resolve EAP/802.1X authentication failures
- Proactive RMA
- Add missing VLANs
- Fix misconfigured ports
- Identify bad cables
- Find L2 loops
- Identify device compromise & risk to the network

Reactive troubleshooting → Proactive prevention & remediation

Summary

Experience Is What Matters

From building better networks...
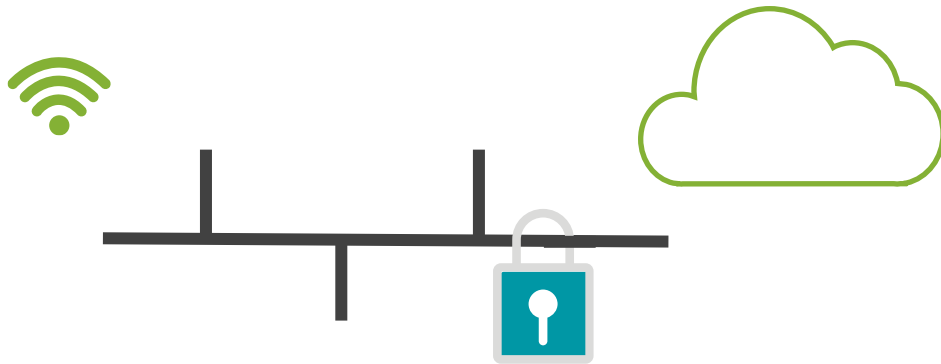
...to making networking better.

AI enables IT to deliver better user and client experiences with automated operations

Figure 1. Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure

Juniper Networks is a Leader in the 2021 Gartner® Magic Quadrant™ for Enterprise Wired and Wireless LAN Infrastructure

This is Juniper's 2nd consecutive year as a Leader in this market.

Juniper has the furthest position of any vendor in both Ability to Execute & Completeness of Vision.

2 Years a Leader
Positioned Furthest in Execution & Vision